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**1995 ENVIRONMENTAL TRENDS IMPACTS REPORT
FINAL REPORT**

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1995 ENVIRONMENTAL TRENDS IMPACTS REPORT

Life Systems, Inc.

October, 1996

ABSTRACT

This document supplements the 1995 Environmental Trends Update Report. It analyzes the impacts on the Army of the fifty-five environmental trends and ten emerging issues identified as having significance to the U.S. Army. The information is current through December 31, 1995.

The trends cover twelve major areas of interest: Enforcement, Legislation, and Regulation; Administration, Cleanup, Compliance; Pollution Prevention; Conservation, Energy; Risk Assessments and Audits; International Activities and Global Problems, Economics and Cost, Interest Groups and Public Opinion; and Education and Employment. Impacts of these trends are analyzed in nine areas: infrastructure, personnel, funding, technology development, policy development, public relations, reporting, quality of life, and readiness.

This report also analyzes the impact of ten emerging environmental issues that have recently gained increased attention, but have not yet become trends. It also includes an impact analysis of both national and foreign public attitudes and opinions concerning the environment and the impacts of the activities of environmental interest groups in the U.S. and host nations are also discussed.

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LIST OF ACRONYMS AND ABBREVIATIONS

AEC	Army Environmental Center
BRAC	Base Realignment and Closure
CAAA	Clean Air Act Amendments
CERES	Coalition of Environmental Responsible Economies
CFC	Chlorofluorocarbon
COE	Corps of Engineers
CONUS	Continental United States
CSO	Combined Sewer Overflow
CWA	Clean Water Act
CWWG	Chemical Weapons Working Group
DERA	Defense Environmental Restoration Account
DfE	Designed for Environment
DoD	Department of Defense
DOE	Department of Energy
EMF	Electromagnetic Fields
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EU	European Union
EWG	Environmental Working Group
FGS	Final Governing Standards
GATT	General Agreement on Tariffs and Trade
GEMI	Global Environmental Management Initiative
GIS	Geographic Information Systems
ISO	International Standards Organization
ISR	Installation Status Report
MACOM	Major Army Command
MACT	Maximum Available Control Technology
MSW	Municipal Solid Waste
NAAQS	National Ambient Air Quality Standards
NAFTA	North American Free Trade Agreement
NBS	National Biological Survey
NCP	National Contingency Plan
NOV	Notice of Violation
NPL	National Priorities List
OCONUS	Outside Continental United States
OB/OD	Open Burning/Open Detonation
ODS	Ozone Depleting Substances
OEBGD	Overseas Environmental Baseline Guidance Document
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
PAPA	Pollution Abatement and Prevention Analysis
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SERDP	Strategic Environmental Research and Development Program
TQEM	Total Quality Environmental Management
US	United States
UWR	Universal Waste Rule

1. Introduction

This document discusses the potential impacts on the Army of the environmental trends, environmental issues, public opinion survey results, and activities of environmental interest groups reported in the 1995 Environmental Trends Update Report (Life Systems 1996). The reader is referred to the 1995 Environmental Trends Update Report for additional information on each trend and issue, public opinion survey results, and interest group activities. References to changes in intensity and direction of trends in this report can be compared to the intensity and direction of the same trends reported in the 1994 Environmental Trends Update Report (Life Systems 1994). Trend and issue data is current as of December 31, 1995. The impact analysis was conducted based on data presented in the trend and issue analyses.

Chapter 2 presents the potential impacts on the Army and Chapter 3 provides a summary of the overarching conclusions and impacts on the Army. Impact analysis concentrated on both continental United States (CONUS) and outside CONUS (OCONUS) installations and garrison and field operations during peacetime and contingency. Discussion primarily focuses on CONUS operations; however, OCONUS is addressed for specific topics and impacts. Similarly, peacetime and security and support operations are noted when impacts could possibly be different.

Army-specific data supporting the impact analyses were included where available. Gaps in consolidated Army data, however, are still apparent. Sources for Army-specific data included personal contact with environmental staff personnel at the Army Environmental Center (AEC), Corps of Engineers Public Works Center, Army Materiel Command, Environmental Training Support Center, and Corps of Engineers Laboratories. Data from the Corps of Engineers Installation Database, General Accounting Office reports, and Congressional testimony were also used to assess potential impacts. The data accumulated were used to determine the intensity of the impacts (significant or minor) and where the impacts may occur within the Army.

The research effort considered potential impacts in nine areas. The general scope of each area and examples of potential impacts are described below. Each impact analysis may not specifically mention one of the nine areas in the text, however, the impacts were subjectively placed into the nine areas based on the analysis.

- Infrastructure - includes installation facilities, military construction, operations, and maintenance (O&M) activities, contracting, and environmental organizational changes. Significant potential impacts could increase the number of O&M projects at cleanup sites, expand construction of chemical agent demilitarization facilities, compel upgrades to water and wastewater treatment, distribution, or collection systems, increase facility ventilation systems maintenance and construction, and expand the evaluation of environmental performance in contracts.

- Personnel - includes staffing requirements, training requirements, service schools, and personnel expertise. Significant potential impacts include changes in workforce size and skills to accommodate multimedia and consolidated environmental management, escalation of certification requirements for environmental staff, and shifts to outsourcing and privatization of environmentally related operations.
- Funding - includes costs, spending, and prioritization of resources. Significant potential impacts could reduce funding requirements due to streamlined staffs and fewer requirements, increase costs associated with procurement of environmentally preferable products, increase spending for litigation, increase costs due to intensified demand for resources, and increase spending on data collection, analysis, risk communication requirements, and stakeholder involvement.
- Technology development - includes environmental research, health research, laboratory services, off-the-shelf technology modification and technology transfer, and implementation. Trends and issues can invigorate or reduce specific technology development programs, change the importance and number of collaborative research efforts, shift emphasis towards recycling, life cycle assessment and pollution prevention in the technology development process, emphasize development of dual-use technologies, and alter contributions Army funded research can make on global environmental problems
- Policy development - includes policy and regulatory development, coordination, and oversight. Significant potential impacts include increased tracking of legislative, regulatory, and litigation activities at federal, state, and regional levels, increased efforts in coordinating, communicating, and implementing policy because of expanded stakeholder involvement, increased evaluation and inclusion of ecosystem factors in policy, and expanded use of environmental audits and assessments.
- Public relations - includes influencing and the influence of the public's, the regulatory community's and lawmakers' perception, and attitude towards environmental matters. Significant potential impacts can elevate emphasis on participating in and reporting voluntary activities, expand involvement in local community activities and programs, and increase the amount of communication required with stakeholders, regulators, and legislators
- Reporting - includes internal and external reporting, data collection and analysis, information systems, and data provided to regulators or the public. Significant potential impacts can increase reporting to Congress, regulators and stakeholders, expand data collection efforts for previously unreported or minimally examined environmental emissions or indicators, and shift the focus of audits and assessments
- Quality of life - includes protection and promotion of health, safety improvements, improvement of home, work, and recreational areas, and enhancement of environmental literacy. Potential impacts can intensify evaluation of health risks associated with a toxic

or hazardous substance, accentuate development of technologies to reduce military and civilian risk, emphasize procurement of less hazardous equipment and supplies, and require improvement in management of military activities to sustain or enhance quality of life, such as noise abatement. Quality of life is also indirectly impacted by all impacts that require funding since they generally undercut quality of life initiatives.

- Readiness - includes training, equipment, facilities, and personnel preparedness. Impacts can affect changes that alter performance of military equipment and weapons systems, restrict land use or training times because of environmental degradation or annoyance, and limit use of untested materiel or prophylactic measures due to human health or environmental risks. Similar to quality of life, readiness is also indirectly impacted by all items that affect the budget.

The following tables list the areas most impacted by the environmental trends, issues, and current public opinion and interest group activities. Table 1-1 lists the areas that the trends can impact. Table 1-2 includes areas that the issues can impact, and Table 1-3 lists the areas that public opinion and interest group activities can impact. Each table subjectively lists potential impacts as significant, minor, or insignificant. Section 2 of this report discusses the impacts.

Table 1-1

Impacts of Environmental Trends

TRENDS				IMPACTS								
No	Topic	Intensity	Direction	Infrastructure	Personnel	Funding	Technology Development	Policy Development	Public Relations	Reporting	Quality of Life	Readiness
1	Federal enforcement	••	↑		M	S			M	M		M
2	Federal oversight	••	→					M		S		
3	State and local government involvement	••	↑		M	M		M		S	M	
4	Multimedia environmental management	•	↑		M	M	M			S		
5	Judicial interpretation	•	→	M	M	M		S		M		
6	Interstate waste disposal	•	→	M		M						
7	Consolidation of environmental laws, regulations, and programs	•	→	M	M	S	M	S		M		
8	Environmental data collection and analysis	•	↑		S	M		M		S		
9	Voluntary activity	••	↑			M			S	M	M	
10	TQEM usage	•••	↓		M			M				
11	Hazardous waste cleanups	••	↑	S		S	S	M			M	

Intensity: • = gradual •• = steady, continued ••• = quick, rapid, swift
Direction: ↓ = decreased, softened, opposition to → = leveled off, controversial ↑ = increased, grew, gained, stricter
Impact: S = significant impact M = minor impact Blank = insignificant impact

Table 1-1 Continued

TRENDS				IMPACTS								
No	Topic	Intensity	Direction	Infrastructure	Personnel	Funding	Technology Development	Policy Development	Public Relations	Reporting	Quality of Life	Readiness
12	Lead	•	→	M		M	M				M	
13	Incineration	••	→	S		M	S		M			
14	Water quality	••	↑	S	M	S	M				M	M
15	Combined sewer overflows and stormwater	•	→	M		M						
16	Air quality	••	↑			M	S	M		S		M
17	Indoor air	••	↑	S		M				S	M	
18	Noise	•	↑				S	S	M		M	M
19	Pollution prevention	•••	↑		M	M	S			M		
20	Landfills	••	↓	M		M			M			
21	Recycling	•••	↑	M			S		S	M		M
22	Nonpoint source pollution	••	↑	S	M	M		M				M
23	Pesticides	•	↑		M		M				M	

Intensity: • = slow, gradual •• = steady, continued ••• = quick, rapid, swift
Direction: ↓ = decreased, softened, opposition to → = leveled off, controversial ↑ = increased, grew, gained, stricter
Impact: S = significant impact M = minor impact Blank = insignificant impact

9-1 Table 1-1 Continued

TRENDS				IMPACTS								
No	Topic	Intensity	Direction	Infrastructure	Personnel	Funding	Technology Development	Policy Development	Public Relations	Reporting	Quality of Life	Readiness
24	Chlorinated compounds	••	→	M		S	S	M		M		S
25	Wetlands	•	↑					M		M		
26	Coastal environments	••	↑	M				M	M	M		
27	Ecological risks	••	↑			S	M	S	M	M		S
28	Cumulative environmental impacts	••	↑		M		S		M		M	M
29	Natural resource damage	•••	↑		M	S		S		M		M
30	Biodiversity	••	→		M					M		M
31	Energy production and environmental quality	••	→	M		M	M			M	M	M
32	Energy conservation	•••	↑	M		M			M		M	
33	Environmental audit standards	•••	↑		M	M		S	M	S		
34	Classification of hazardous waste	••	→				M			S		

Intensity: • = slow, gradual •• = steady, continued ••• = quick, rapid, swift
Direction: ↓ = decreased, softened, opposition to → = leveled off, controversial ↑ = increased, grew, gained, stricter
Impact: S = significant impact M = minor impact Blank = insignificant impact

Table 1-1 Continued

TRENDS				IMPACTS								
No	Topic	Intensity	Direction	Infrastructure	Personnel	Funding	Technology Development	Policy Development	Public Relations	Reporting	Quality of Life	Readiness
35	Comparative risk analysis and risk management	...	↑			S	M	S	M	M	M	
36	Human health risks	..	↑		M	S	M	M		S	S	M
37	Cost benefit analysis	...	↑			S	M	M				
38	Life cycle assessment	•	↑		M	M	S	M				
39	Foreign environmental requirements	•	↑	M	M	S			M	M		
40	Competition for land, water, and other resources	..	↑	S		S	M				M	M
41	Sustainable development	...	↑				M	M				
42	Climate change	..	→				S					M
43	International trade agreements	..	↑			M		M				M
44	Compliance costs	..	↑	M		S	M					M
45	Remediation spending	•	↑			S	M		M		M	

Intensity: • = slow, gradual .. = steady, continued ... = quick, rapid, swift

Direction: ↓ = decreased, softened, opposition to → = leveled off, controversial ↑ = increased, grew, gained, stricter

Impact: S = significant impact M = minor impact Blank = insignificant impact

Table 1-1 Continued

TRENDS				IMPACTS								
No	Topic	Intensity	Direction	Infrastructure	Personnel	Funding	Technology Development	Policy Development	Public Relations	Reporting	Quality of Life	Readiness
46	Waste disposal costs	•	↑	M		S	M	M	M			
47	Market incentives	••	↑			M		S	M			
48	Privatization	•	↑	S	M	S		M				
49	Environmental technology development and export	••	↑			M	S				M	
50	Public opinion	••	↑		M	M			S			
51	Environmental interest groups	••	↑						M	M		
52	Environmental seals	••	↑	S		M					M	
53	Environmental equity	•	↓			M		S	M			
54	Environmental education and employment	••	↑		S	M						
55	Certification/registration	••	↑		S	M						

Intensity: • = slow, gradual •• = steady, continued ••• = quick, rapid, swift

Direction: ↓ = decreased, softened, opposition to → = leveled off, controversial ↑ = increased, grew, gained, stricter

Impact: S = significant impact M = minor impact Blank = insignificant impact

Table 1-2

Impacts of Environmental Issues

ISSUES			IMPACTS								
No.	Topic	Intensity	Infrastructure	Personnel	Funding	Technology Development	Policy Development	Public Relations	Reporting	Quality of Life	Readiness
1	Environmental hormones	■ ■				M				S	M
2	Electromagnetic fields	■				S				M	M
3	Fiberglass and ceramic fibers	■	M			S					M
4	Natural bioattenuation	■ ■	M		S	M	M				
5	State level regulatory reform	■	M		M		S		M		
6	Emerging pathogens	■ ■	S	M	S	M					M
7	Chemical and biological agent terrorism	■	M	M		S	M				M
8	Triazine pesticides	■ ■				M				S	M
9	Fine ambient airborne particulate matter	■			S	S		M			S
10	Women's health	■			M	M				S	S

Intensity:

■ = slowly building ■ ■ = rapidly gaining attention

Impact:

S = significant impact M = minor impact Blank = insignificant impact

Table 1-3

Impacts of Public Opinion and Interest Group Activities

ACTIVITY		IMPACTS								
No	Topic	Infrastructure	Personnel	Funding	Technology Development	Policy Development	Public Relations	Reporting	Quality of Life	Readiness
1	Domestic public opinion	M	M	S	S	M	S	M		M
2	Foreign public opinion	M		S			M		M	S
3	Domestic interest groups	M		S	S	S	M	S		M
4	Foreign interest groups			M			M			

Impact: S = significant impact M = minor impact Blank = insignificant impact

2. Potential Impacts on the Army

This section discusses the potential impacts on the Army of each trend and issue, the public opinion survey results, and activities of environmental interest groups reported in the 1995 Environmental Trends Update Report (Life Systems 1996). Readers seeking more information on a trend, or issue, public opinion, or interest group activities should refer to the 1995 Environmental Trends Update Report. References to changes in intensity and direction can be compared to the intensity and direction of the same trends reported in the 1994 Environmental Trends Update Report (Life Systems 1994).

Although the criteria differentiating issues and trends was applied, issues on the verge of becoming trends are not easily discerned. There may be some data supporting the topic as a trend while other data support it as an issue. The classification as an issue or trend is not as important compared to presenting the information and assessing the potential impact on the Army.

This section consists of fifteen subsections. The first twelve subsections (2.1 through 2.12) correspond to the twelve trend groupings used in the 1995 Environmental Trends Update Report. The final three subsections address the potential impacts of the ten issues (2.13), public opinion (2.14), and environmental interest groups (2.15) also reported in the 1995 Environmental Trends Update Report.

2.1 Enforcement, Legislation, and Regulation

The six trends in this group cover trends in environmental protection enforcement actions, legislation, and regulation. These trends changed only slightly since reported in the 1994 Trends Update Report. Trend direction remained the same for each trend, but intensities changed.

2.1.1 Trend 1 Federal Enforcement

Federal environmental enforcement (both criminal and civil) continues to steadily increase with greater emphasis on compliance

The U.S. Environmental Protection Agency (EPA) redesignated the Office of Enforcement as the Office of Enforcement and Compliance Assurance, marking a shift of emphasis to compliance assurance. FY94 enforcement actions increased from FY93 and the FY95 pace was similar to FY94. The FY96 budget impasse reduced EPA enforcement actions taken in the first quarter of FY96.

Enforcement or threat of enforcement, influences the Army's environmental spending requests and allocation of resources to favor achieving or maintaining compliance over discretionary environmental investments. Additionally, enforcement actions impact readiness directly at the installation level by reducing available base operations funding. In this situation, a particular installation can be severely affected. EPA's shift in emphasis and the Army's increased emphasis on compliance may have contributed to the decrease of approximately twenty-one percent in Army-related enforcement actions by EPA in FY95 (Fitz 1996). Budget cuts and staff reductions at EPA may result in reduced overall enforcement activity and fewer enforcement expenditures at federal facilities.

Environmental enforcement actions at an Army installation that get public and media attention adversely affect the Army's image in the community and region and can affect the Army's image on a national scale. Public affairs efforts, legal costs, and diversion of command time from other duties are impacts associated with environmental enforcement. There is a continuing need for the Army to interact with the regulatory community, which requires personnel time. Some relief at the installation level may occur as the ten Department of Defense (DoD) regional support centers become fully operational.

The Army may experience increased difficulty in recruiting and retaining environmental personnel due to the risk of litigation and their vulnerability to prosecution. Pending reauthorizations of major environmental legislation, such as the Safe Drinking Water Act (SDWA), subject federal employees to criminal sanctions but preclude civil penalties. The same legislation subject federal agencies to civil penalties with no criminal sanctions. Upper management may be more at risk than lower level environmental staff.

2.1.2 Trend 2. Federal Oversight

Federal environmental oversight remains fragmented despite streamlining of congressional committees and subcommittees

When the Republicans gained control of the House and Senate as a result of the November 1994 elections, there was a restructuring of some congressional committees and subcommittees. This restructuring did not appear to be a factor in the paucity of environmental legislation sent to the president for signature in 1995. The realignment of committees does not diminish the need for the Army to monitor environmental legislation and regulatory activity closely, but it does simplify the requirements very slightly.

This publicized streamlining had little affect on environmental legislation or on the DoD authorizations and appropriations bills hearings. Congressional attention in the environmental budget requests in DoD authorizations and appropriations bills has centered on concern over site cleanup and chemical agent/munitions demilitarization programs. The size of these programs and controversy surrounding them make them probable candidates for continued close oversight by Congress as part of the DoD budget process.

Streamlining committee and subcommittee structure should make legislation move faster through Congress and reduce the number of hearings and committee/subcommittee reports. This will make the role of DoD and the Army easier in monitoring, reviewing, and commenting upon impacts of proposed legislation and should reduce the number of appearances by Army staff at hearings.

Because other items were considered to be of greater importance and priority and because of the lack of bipartisan support, major environmental reauthorizations, such as Superfund, the Clean Water Act (CWA), SDWA and the Endangered Species Act (ESA), did not occur during 1995. The Army, as do all others anticipating compliance requirements, faces uncertainty of not knowing if legislative amendments or reauthorizations will relax certain standards or schedules, shift emphasis, or retain requirements and direction. Outyear planning and budget requests, particularly involving infrastructure, are subject to significant change. Overall, it appears more likely that compliance schedules will be extended, not shortened, and there will be greater flexibility given in meeting standards.

Congressional earmarking of Army funds to either carry out a certain environmental activity or prohibit use of funds for an activity restricts the Army's management. Earmarking of the Army's environmental funds declined in 1994 and 1995. If directed funding by Congress continues to be small, Army management will maintain greater control over its environmental program.

In an apparent attempt to demonstrate environmental leadership and interest, the President issued several environmental executive orders and EPA used administrative actions to implement some of its agenda. The expansion of toxic release reporting to companies

seeking government contracts by an executive order, coupled with EPA's actions to increase the number of chemicals reported, will result in contractors passing on these costs to the government as higher overhead and labor costs. An increase in the monitoring and reporting costs at Army installations with contractor operations is anticipated. Unlike legislation and regulation which moves through various steps that can be monitored and actions that can be anticipated, executive orders and administrative actions occur quickly and sometimes with no advance notification. This can impose unforeseen and unbudgeted requirements on the Army and require diversion of resources to meet the requirements.

2.1.3 Trend 3. State and Local Government Involvement

State and local government environmental programs continue to steadily increase as has concern over resource allocation and oversight.

As the cost to state and local governments to comply with unfunded federal environmental mandates has risen, there has been increasing support to curtail unfunded mandates and devolve environmental programs to the states. Congress enacted the Unfunded Mandates Reform Act; however, it does not apply to existing legislation. Environmental mandates represent the largest unfunded area of all federal programs for state and local government.

Factors at play affecting state and local government environmental programs are the move towards devolution, a rollback of some state requirements to federal levels, and enactment of environmental legislation and promulgation of regulations in areas where the federal government has not acted.

When state and local governments are forced to increase environmental spending, they either have to reduce spending in other areas or increase their revenue bases. They can also impose environmental surcharges such as permit review fees to fund environmental programs. These actions affect the quality of life for military personnel and their dependents by lowering spending on education, roads, and services and/or increasing taxes (income, property, sales, etc.)

Increased devolution of environmental programs from federal to the state level will require the Army's environmental program to be coordinated more closely with state and local officials. This requires greater interaction and more time from the Army's environmental personnel. The priorities within states and regions of the nation are likely to be different, therefore, the Army will need to interact more frequently and openly with stakeholders. For example, the residents of coastal states have greater concern over wetlands and protection of coastal areas than landlocked states, and western state residents have more concern over water rights because of the demand and supply balance of fresh water on their region. Project priority setting for Army environmental projects should accommodate the comparative risk ranking assigned by the state as well as mandated compliance by law or regulation.

Enforcement among states is likely to be more variable than enforcement currently carried out by the EPA. Some states may target federal facilities for enforcement for political reasons or because federal facilities are safer enforcement targets for the states since the federal facility is not likely to threaten to move out of the state or curtail activities because of environmental compliance costs. States and local governments may also demonstrate less incentive to deal with federal facilities because they recognize ongoing "corporate" oversight and may choose to devote scarce resources to less-monitored private sector industries. Other states may adopt a laissez faire policy toward big business and government to ensure long-term employment opportunities in the state. Cutbacks in enforcement generally reduce the number of notices of violation (NOV). This would improve the Army's environmental image but can make it more difficult to get funding because correcting NOVs has visibility and gets priority.

The emphasis on performance partnerships at state and regional levels may extend to partnerships between Army installations and state and local governments. These partnerships could influence the collection and distribution of environmental data by the Army and the prioritization of installation environmental projects. Depending on what the data indicate, the impact on the Army could be positive or negative. Data indicating a healthy or improving environment would be positive. Indications of environmental deterioration caused in part or total by the Army would obviously have a negative impact on the Army's image and put pressure on the Army to take corrective action. If the installation is unable to follow through on its commitments, regardless of the reasons, there will be a negative effect on the Army's image.

Finally, Fort Campbell and Fort Bliss, installations bordering two states, will face the requirements of both bordering states. If the environmental laws and regulations of the bordering states are different, these installations will encounter dual requirements which could result in litigation and multiple and differing inspections, enforcement actions, permit applications, reporting, and record keeping.

2.1.4 Trend 4 Cross-program/Multimedia Environmental Management

Multimedia legislative and regulatory efforts continue to grow at a cautious pace.

Several recently initiated EPA and state pilot programs, such as EPA's sector notebooks or Common Sense Initiative, test the effectiveness of multimedia regulatory approaches.

The near-term impact of multimedia efforts may increase consolidated cross-program/multimedia inspections of Army installations by regulators. In anticipation of increases in this type of inspection, the Army's internal audits and inspections should be multimedia. Increased multimedia efforts will require changes to Army databases and the internal organization of environmental offices in the mid-term timeframe. Multimedia efforts reduce redundancy and paperwork and eliminate contradictions among media specific

legislation and regulation. If these benefits are realized, there will be obvious long-term beneficial impacts on the Army as there will be on everyone who faces environmental compliance requirements.

If multimedia efforts progress to their full potential (integration of natural resources, occupational health and existing environmental responsibilities), significant organizational structure, and program planning, funding, and execution changes will be required. Complete integration is certainly unlikely in the near-term, but is a longer-term possibility. The Army's four pillar environmental structure gives the appearance of inhibiting multimedia projects and management, with the result that regulators may need special orientation, or the Army might find it advantageous to design a new descriptive framework to implement and explain multimedia programs

2.1.5 Trend 5 Judicial Interpretation

The federal judiciary continues its conservative interpretation of environmental legislation with somewhat of a centrist shift within the Supreme Court.

The two Clinton appointments to the Supreme Court have yet to make an impact on environmental law due to the nature of the cases brought before the court in 1994 and 1995.

The Army is affected both by rulings in which it is a party and by precedent set in other environmental case decisions. Environmental litigation will continue and the federal judiciary will play an important role in interpreting environmental laws and regulations. Citizen suits are an integral part of most federal environmental laws. Provisions for citizen suits subject the Army to litigation as do the joint and several provisions of Superfund. The next Presidential administration will likely make two or three Supreme Court appointments. These appointments provide an opportunity to change the Court's balance or sustain its current makeup

The Army cannot eliminate its vulnerability to litigation, but it can track, learn from, and react to judicial rulings and assess their implications to reduce litigation brought against it. The Army should continue to consider analysis of judicial rulings, proposed federal and state legislation, and executive orders in policy development

2.1.6 Trend 6 Interstate Waste Disposal

Solid waste flow control remains controversial as federal inaction continues

Solid waste flow control has remained controversial since the 1994 *Carbone* decision. The introduction of legislation to address the topic increased, but no federal level enactments occurred

Solid waste flow control may hurt Army installations that do not have on-post landfills or other disposal facilities and those whose wastes cross state lines for disposal. Installations near state lines could face increased disposal costs because of longer haul distances to dispose of waste within the state of origin. The control of waste (both hazardous and solid) from installations and operations outside the Continental United States (OCONUS) is also a potential problem since restrictions on waste imports may apply to waste returned to the United States because the countries in which the U.S. troops are deployed, such as Panama and Bosnia, do not have adequate facilities for waste treatment or disposal.

Intra-installation waste transport for waste generated in two neighboring states, such as at Fort Bliss and Fort Campbell, could face regulation for waste transport across state lines. Installations may also face increased pressure to allow civilian communities to use installation landfills. Currently, AR 200-1 prohibits operation of Army-owned landfills as municipal or regional landfills, or their use as the local community landfill.

2.2 Administration

This group consists of four trends focusing on environmental management practices. The direction for three of the trends in this group remained unchanged since 1994. Intensities have remained basically unchanged for three of the trends.

2.2.1 Trend 7 Consolidation of Environmental Laws, Regulations, and Programs

Consolidation of federal environmental laws, regulations, and programs appears stagnant, however, there is some progress at other levels.

The 104th Congress introduced legislation that followed media-specific topics. The administration's regulatory reform agenda created some movement in regulatory change. Think-tanks provided analyses that embrace multimedia environmental approaches.

Consolidation of federal environmental laws, regulations, and programs would likely result in reduced paperwork for all of the regulated community. While consolidation does not assure this will occur, it would almost certainly occur because of the recognition that the burden is excessive. If EPA continues along the lines of focusing on major industry sectors, EPA will not address many of the Army's major pollutant sources and none of its unique pollution sources such as munitions waste, chemical agents, and equipment surface coating in the foreseeable future, compelling the Army's technology development program to concentrate more funding on military-specific projects. If states continue to take the lead in consolidation, confusion is likely to occur in the regulated community, including the Army, because of differences among states and between federal and state regulations as states proceed at different paces to consolidate. What is already complex may become more complicated.

If consolidation proceeds, reorganization of Army environmental offices to align with consolidated laws, regulations, and programs would appear necessary since many are staffed along media lines.

2.2.2 Trend 8 Environmental Data Collection and Analysis

Coordination and implementation of federal and state environmental data collection and analysis efforts have continued to be slow but are set for expansion.

Trends in environmental data collection and analysis remained basically unchanged since 1994. Implementation of the National Environmental Performance Partnership System, a program providing environmental funding based on goals and indicators, was expected in FY96, but the budget stalemate prevented the start of the program. More attention to this topic will come with the publication of the report by the President's Council on Sustainable Development and the National Environmental Goals. After several delays, both are now scheduled for publication in 1996.

Any federal level environmental budget cuts will probably include proportionally larger cuts in environmental data collection funding. Shifts in the types of environmental data collected, methods of collection, and analyses will require changes in the Army's data collection, analysis, and reporting. Changes in data requirements will also require adjustments to the Army's information systems, staffing, record keeping, and laboratory facilities and equipment. Better data should lead to improved planning and better resource allocation. The Army is likely to see its data integrated with other data to provide data for larger geographic areas as an element of ecosystem management. The overall state of the environment in an area or region will influence priorities and programs within the area. External factors, those outside of the DoD, will increase in their influence on the Army's environmental program.

Activity indicators retain their popularity because they are easier to measure than environmental quality indicators, easier for non-scientists to understand and are easily quantified. The Army should closely monitor changes in environmental indicator use to determine where it may have shortfalls in collection efforts. Several state-level environmental indicator programs were recently initiated. The Army should examine the environmental data at installations in states that have or are scheduled to initiate indicator programs. The Army should also prepare to make full use of the data it collects, with both immediate and long-term values considered, to maximize the value of the investments made.

Increased public availability of data will make the Army, like others, vulnerable to use of that data by interest groups and the media. The Army needs to examine security considerations for environmental data both on a stand-alone basis and when the data are combined with other types of data.

2.2.3 Trend 9 Voluntary Activities

The private sector continues to steadily increase its voluntary environmental activities.

Programs such as pollution prevention, sustainable development, and energy conservation witnessed a steady increase in voluntary participation within the private sector.

The private sector's increase in voluntary environmental activities, coupled with greater opportunities for voluntary actions as a part of regulatory reform, put the Army in a position to consider making major adjustments in its investment strategy. The public perception of the Army's claim to environmental excellence and leadership may be lost if the Army does not go beyond compliance in selected areas and do an effective job in communicating stewardship. Budgetary consideration may temper public pressure for federal facilities to achieve and maintain environmental excellence beyond "letter of the law" compliance. Therefore, getting funding for voluntary activities is likely to become increasingly difficult unless the voluntary activity demonstrates a favorable cost benefit, addresses a significant risk, or improves readiness.

In addition to improving communication, the Army may be forced into setting new goals. The reporting by federal facilities of SARA Title III data will result in increased public scrutiny and pressure to voluntarily reduce the use of hazardous chemicals. This has been a trend in the private sector that can be expected to affect the Army.

The Army may also find it necessary to consider expanding reporting of its environmental successes to keep pace with the private sector's embrace of voluntary programs.

2.2.4 Trend 10. TOEM Usage

Use of Total Quality Environmental Management (TOEM) as a separate concept has rapidly declined as it evolves into strategic environmental management concepts.

Membership in the Global Environmental Management Initiative (GEMI) and endorsement of the Coalition of Environmental Responsible Economies (CERES) principles both declined. However, advocacy of TOEM principles in strategic environmental planning emerged.

Implementation of TOEM principles requires the Army to continue to expand its environmental training, ensuring the environmental ethic is instilled in all soldiers, the civilian workforce, and Army contractors. Greater pride in ownership and individual participation can enhance the participation and involvement of the Army's workforce in executing the environmental plan.

To promote greater use of the strategic environmental management principles, the federal government could require all or certain of its contractors to establish and maintain specific environmental management programs. This could result in increased cost to the Army as contractors pass on overhead cost increases. The Army could make changes in acquisition regulations and evaluate contractors' environmental management programs in competitive procurement selection or require certain minimums by all contractors.

2.3 Cleanup

The two trends in the cleanup group did not change in direction or pace compared to the 1994 Environmental Trends Update Report

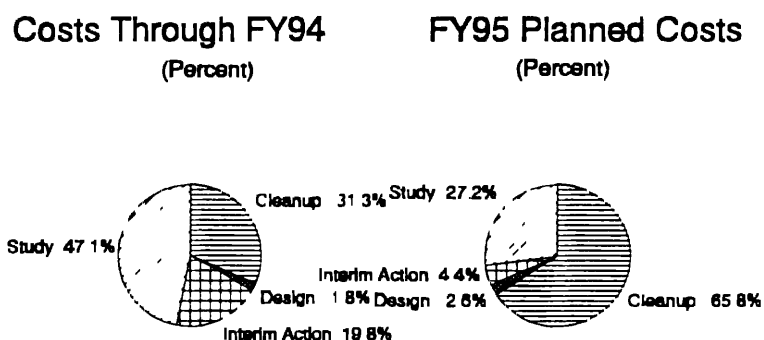
2.3.1 Trend 11 Hazardous Waste Cleanup

The pace and costs of hazardous waste cleanups are still increasing

Changing Superfund from joint and several party liability to limited liability with timelimits has been the center of proposed Congressional changes to increase the pace and reduce the cost of cleanups. Brownfields (former urban industrial sites with suspected environmental contamination) emerged as a significant cleanup emphasis at both state and federal levels.

Changes to Superfund could be significant to the Army's environmental program because the Army's installation restoration program continues to be a major environmental expenditure. The extent and nature of the impacts are uncertain because it is unclear what changes, if any, will be made to Superfund and when the changes will be effective. Liability changes to Superfund may affect contractor liability on Army installations. The decreased likelihood of adding Army sites to the National Priorities List (NPL) as a result of new procedures used for NPL designation should relieve some pressure on the Army to expedite cleanup. NPL sites typically get greater attention by state and local governments and also tend to draw more local media attention. This heightens community concerns over environmental risks at these sites and results in pressure for accelerated cleanup. Increased state oversight involvement in federal cleanups will require increased coordination and interaction with the

Figure 2-1 Army DERA Costs



Source: DOD, 1995, Defense Environmental Restoration Program Annual Report to Congress for Fiscal Year 1994

responsible state agencies. For economic development reasons, state and local governments tend to lobby for speedy cleanup of sites where a property transfer from the Army is involved.

Congressional oversight and budget allocations for both site cleanup and technology development will likely continue to reflect the concern over the high cost, slow pace of cleanup, and the relatively low risk assigned to site contamination in relationship to other environmental risks. In FY95, (Figure 2-1), about two-thirds of

the Army's Defense Environmental Restoration Account (DERA) funds were planned to go to cleanup and a third for studies, interim actions, and design. Through FY94, the cost of design, studies, and interim actions accounted for about two-thirds of costs (DoD 1995). However, public attention to cleanup at Army sites demands stakeholder involvement which can contribute to extending cleanup schedules and reducing the amount of funds spent on actual cleanup.

Increasing costs for site cleanups will result in the Army's cleanup program being extended in time beyond the present schedule unless there are budget increases. If spending for site cleanup is increased, it will probably be at the expense of other environmental programs with pollution prevention and conservation the most likely losers.

The Army must develop improved priority-setting mechanisms to explain and defend decisions on deferred site cleanups and on sites selected for cleanup. Protection of groundwater, used as a source of potable water at eighty-five Continental United States (CONUS) Army facilities, should be a significant factor in the prioritization since drinking water represents a potential human exposure pathway for chemical contaminants at these sites.

Local and state governments increased their calls for more rapid cleanup and transfer of base closure sites. This pressure could result in diversion of funding for cleanup at active military sites, where risks may be greater, to Base Realignment and Closure (BRAC) sites. Continued use of the Fast-Track Cleanup Program, which has demonstrated quicker results in preparing land for lease or transfer, may require greater funding in the future as BRAC 95 installations are evaluated. Community involvement in the BRAC process, which attempts to expedite property availability, may help generate more reasonable cleanup standards and approaches.

2.3.2 Trend 12. Lead

Concern over lead exposure is now primarily focused on residential lead in older buildings

Since the water distribution systems and fixtures at many Army installations are old, the possible lead provisions in the pending SDWA amendments would require significant inspection and replacement of piping and fixtures in family housing, dependent schools, barracks, and so forth. There are 108,000 Army family units old enough to contain lead-based paint so the probability of lead in the plumbing systems of these units is also high. DoD estimates that lead-based paint mitigation will cost over \$1 billion over the next ten years (SERDP 1995).

The Army is assessing the impact of lead-based paint and initiating programs to remove and dispose of lead-based paint from buildings in an environmentally safe manner. This trend supports continuation of the assessment and development of lead-based paint removal technologies that are more efficient and environmentally favorable to existing

technologies. The problem of airborne lead at the Army's sixty-one indoor firing ranges has not been fully defined, assessed, or controlled (COE 1995). This could surface as a significant health threat, primarily to occupationally exposed individuals (personnel assigned to the range).

Laws and regulations on lead and other heavy metal content in recycled material, particularly batteries, could increase the costs associated with some of the Army's recycling initiatives and procurement specifications. For example, HR 2024 (Mercury Containing and Rechargeable Battery Management Act) may cause problems with current battery procurement requirements, but will ease some hazardous waste rules.

2.4 Compliance

Trends in this group focus on programs in the Army's compliance pillar. The direction of compliance trends remained unchanged with only slight changes in intensity.

2.4.1 Trend 13. Incineration

Incineration usage has leveled off

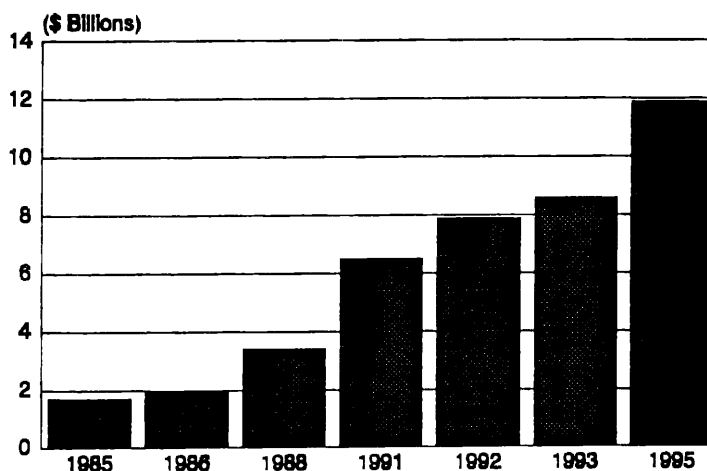
An increase in municipal solid waste (MSW) incineration has been noted, however, a decrease in hazardous waste incineration also occurred. Considering both wastes, incineration usage stabilized in the 1990s. Public opposition to incineration remains strong. Dioxin emissions and a reassessment of dioxin health effects have contributed to the opposition to incineration.

The impact of continued public opposition to incineration, greater public participation, revised federal rules, and requirements for increased state legislation governing incineration can result in the Army facing increased waste disposal costs for contracted disposal of its wastes. For certain hazardous waste, the Army could face the situation of no contractor bidding to dispose of the waste. Any restrictions on MSW incinerations will place greater demand on landfill capacity which could result in increased tipping fees. This places greater emphasis on waste minimization and recycling programs within the Army, as well as all other sectors. The economics of pollution prevention and recycling change depending on waste disposal costs. Therefore the Army's life cycle cost analyses should take into consideration possible changes in cost and disposal requirements.

Incineration is the planned method of disposal of chemical warfare agents and munitions. Concern and opposition to incineration in the chemical demilitarization program is acute. Congressional concern over the continued rise in the life cycle cost estimate for the program (Figure 2-2) also sparked funding

debate in previous years. The impact of this focused opposition can spill over to other waste disposal developments, such as the Army's plasma arc program which has five demonstration facilities (Zaghoul 1996). Pressure by concerned citizens' groups is building on getting state

Figure 2-2 Chem Demil Cost Estimate



Source: GAO 1994. Chemical Weapons Destruction: Advantages and Disadvantages of Alternatives to Incineration. Washington, D.C.: GPO. GAO 1995. Chemical Weapons Destruction: Issues Related to DoD's Management. Washington, D.C.: GPO.

laws to ban incineration or place performance criteria and other requirements on the proposed chemical demilitarization incinerators. The citizens' groups are also pushing for increased R&D funding and broader scoped studies on alternative technologies to incineration for bulk agents and chemical munitions. The opposition's use of litigation could result in delays, additional studies, increased documentation, and added costs. The Army will likely continue to be directed to develop alternative technologies to incineration to address current opposition, and possibly stronger future resistance, to incineration.

2.4.2 Trend 14 Water Quality

Concern over water quality, particularly drinking water, continues to steadily increase as federal legislation remains gridlocked

Although the 104th Congress did not reauthorize or amend the CWA or SDWA by the end of 1995, the House passed a CWA bill and the Senate passed a SDWA bill, but neither chamber voted on the other chamber's legislation. Initial data from the biannual water quality report suggest the nation's overall water quality made only minimal improvement.

Nonpoint source pollution control provisions included in CWA reauthorization could require the Army to control, collect, and treat runoff from training lands, ranges, and maintenance facilities. Personnel training to mitigate environmental contamination may be more cost-effective than engineering control methods to control and/or treat contaminants from certain sources.

More stringent criteria for wastewater and/or drinking water treatment will directly or indirectly increase cost to the Army. Where the Army is connected to a municipal or regional system, rate changes to those served by the system will include cost increases for the Army. The Army could also face different standards established by states or federal legislation in specific watersheds that require treatment modification, additional treatment and monitoring, and reporting changes. The Army has completed changes to many of the 1,200 aging waterworks facilities, which include water and wastewater treatment plants, sewage treatment plants, and potable water distribution facilities, it has world-wide to meet standards (COE 1995). However, major upgrades may loom for many plants to meet new requirements. A shift to privatization for these facilities may become cost-effective. Fort Pickett is the only Army CONUS water purification plant with privatized operation. Fort Gordon is undergoing the privatization process (Eng 1996). The results from these two facilities will provide the Army with information to use in decision-making for additional privatization of water and wastewater treatment plants.

Additional microbiological monitoring of drinking water and increases or changes in treatment plant operator training and certification requirements will impact the Army's staffing and training. State requirements dictate the standards operators of Army plants must meet. Likewise, applicable federal, state, and local regulations dictate certification for the Army's analytical laboratories.

2.4.3 Trend 15 Combined Sewer Overflow and Stormwater

EPA's policy on combined sewer overflow (CSO) has remained a source of troublesome concern and action for state and local governments

The cost of complying with the EPA's CSO policy was questioned based on the relative environmental risk of combined sewers in comparison to other environmental risks. No federal combined sewer legislation was enacted and stormwater requirements and permitting remain sources of concern for affected entities

Any changes in reauthorization of CWA that modify stormwater overflow treatment requirements will affect the Army's CONUS installations with combined sewer systems. The Army has approximately fifteen combined sewer systems in CONUS which represent about one percent of the total number of combined sewer systems in the United States (Zaghloul 1996). Implementation at OCONUS installations will be required by the Army only if foreign countries adopt a policy similar to U.S. policy on combined sewers. OCONUS installations have the majority of combined sewer systems in the Army's inventory (COE 1995).

By January 1, 1997, the Army, like all others with combined sewers, is required to implement the nine minimum control measures at all installations with combined sewers. If the initial measures do not provide sufficient control, more expensive capital improvement projects will be necessary. The lead time for military construction authorizations and appropriations is a barrier to the Army in complying with relatively short deadlines.

If Congress relaxes the CSO requirements through CWA amendment, the Army requirements will be directly affected and the Army's costs associated with upgrading either its own systems or those in the municipalities with CSOs that treat Army installation wastewater will be reduced. If the CSO requirements are not changed, the Army, as a permittee, will be required to implement the nine minimum controls and address long-term control plans

2.4.4 Trend 16 Air Quality

Air quality standards are becoming more strict as Clean Air Act Amendments (CAAA) regulations are promulgated, but improvements in ambient air quality are being offset by vehicle miles, production levels, and energy consumption increases in the 1990s

Continuing implementation of the 1990 CAAA made standards for mobile and stationary sources tougher. Air quality indicators and air pollution emissions, however, show both improvements (sulfur oxides) and degradation (nitrogen oxides)

As long as EPA grants waivers for military tactical vehicles and states accept the waivers, vehicle emission standards will not impact the Army's tactical vehicle fleet. However, the Army will have to consider air quality standards when procuring equipment and

in equipment development if waivers are rejected. If waivers are rejected, DoD will have no choice but to go to Congress for revision of the CAAA. There are currently no procurement options for tactical vehicles. Options exist only in technology development.

If the concern for small airborne particulates results in increased regulation on diesel emissions, the Army's diesel engines (stationary and mobile sources) could face modifications, requirements to phase out older engines in the inventory, or operational limits. This is likely to affect trucks and generators. Diesel engine development efforts to reduce emissions while retaining performance are underway by industry. Local ordinances and state laws may focus on particulate air pollution caused by dust from training which could hinder training land management and result in decreased readiness.

Air quality impacts from open burning/open detonation (OB/OD), fugitive dust, and the use of smokes and obscurants are continuing challenges that the Army faces. The limited understanding of the environmental impact and characterization of pollution caused by OB/OD, tank trails, field runways, and obscurant operations are being increasingly challenged by environmental regulators and interest groups. Alternative technologies have been slow in developing and may require increased investment to dispose of obsolete munitions and propellants and maintain readiness for combat operations involving armored vehicles, aircraft, and smokes and obscurants.

The potential continues for state and local jurisdictions to establish more stringent requirements for air pollution sources regulated under federal programs. This potential appears most likely for nonattainment areas and could, therefore, impact National Guard and Reserve operations as well as Forces Command or Training and Doctrine Command installations located in or near nonattainment or marginal nonattainment areas.

The implementation of CAAA requires each state to establish a standard for control of toxic and hazardous air pollutants based on Maximum Available Control Technology (MACT). When EPA does not promulgate an industry standard, the source must propose a MACT in its Title V application or the state must propose a MACT standard prior to issuance of the Title V permit. The Army should, therefore, ensure that an appropriate MACT standard is established for military-unique and military-significant emissions.

Title V permitting can be a major issue for installations over the next few years, potentially impacting all major pollution sources. In some cases where multiple sources are covered under one permit, relief will be provided to smaller sources.

2.4.5 Trend 17: Indoor Air

Cautious adoption of actions on indoor air pollution continues

There is great difference between the public's and the scientific community's assessment of the health risks associated with indoor air pollution. The public ranks indoor air

as a low risk while scientists consider it as a high risk relative to other environmental risks. Indoor air quality research program activities of several federal agencies continue to shed new light on the problems with indoor air. However, the Occupational Safety and Health Administration (OSHA) has yet to finalize the indoor air quality regulations proposed in 1994.

OSHA's indoor air quality regulations, due in 1996, could impact the design, construction, maintenance, monitoring, and inspection of buildings related to indoor air quality. As a major owner, designer, builder, and manager of buildings covering a wide range of activities, including family housing, barracks, offices, indoor training facilities, indoor firing ranges, shops, and schools, the Army's compliance could result in building renovation costs approaching or exceeding the costs of the lead-based paint and asbestos programs.

The Army faces significant indoor air quality problems due to the relative age of Army facilities and the problems associated with renovating older facilities. Removal of old carpet, for example, releases microbes affecting allergies, causing headaches, and contributing to other sick building syndromes. Impacts on readiness, quality of life, and infrastructure can be expected.

Government buildings and federal agencies could face indoor air quality requirements not applicable to the private sector or requirements imposed earlier by the issuance of executive orders.

2.4.6 Trend 18. Noise

Concern over noise pollution continues to build slowly

Noise pollution is typically a local issue with highly varying levels of public concern. It has low priority at EPA but equipment manufacturers (aircraft, auto, construction, etc.) are producing quieter equipment due to consumer preference. Aircraft noise, at and near airports and National Parks, stirred new actions.

The Army's off-base noise problems center around aircraft noise, primarily helicopters, and weapons firing during testing and training. If encroachment continues at military installations, the Army can expect an increase in complaints about noise from aircraft and weapons firing. Individuals not dependent on the installation for employment may complain more often and more strongly. Environmental justice considerations could become linked with noise because property values are affected by high noise levels, and therefore, areas with significant noise pollution would likely have a higher percentage of lower income individuals.

The effects of noise on wildlife are inconclusive. Research needs to continue in this area as threatened and endangered species continue to find refuge on Army installations. Pending the results, the Army may have to curtail or modify training and testing, as well as operations, if noise adversely affects wildlife, particularly threatened or endangered species. Expanded consideration of noise in environmental impact assessments or statements could

occur. Establishing or expanding buffer zones between the location of Army noise generating activities and off- and on-post residents may be required to reduce complaints.

The other primary options available to the Army to address noise pollution are avoidance of and scheduling of noise causing activities. The development of helicopters with lower noise profiles is a longer-term approach to the helicopter noise problem. Relocating weapons testing and ranges to more remote areas is a major initial cost if the remote areas are not already Army property and ready for weapons testing or training exercise. The use of simulation training eliminates weapons noise and also eliminates the unexploded ordnance problem. Complete elimination of weapons firing is not achievable in the near term.

2.5 Pollution Prevention

This group consists of six trends related to the pollution prevention pillar. Most trends continued to increase in intensity as pollution prevention became widely and strongly endorsed as the preferred environmental management paradigm in the United States and throughout the world.

2.5.1 Trend 19 Pollution Prevention

Pollution prevention continues as the most rapidly growing area of environmental management.

Federal pollution prevention action in 1994 and 1995 centered on new programs at EPA and executive orders, while states continue to enact legislation, promulgate regulations, and offer incentives to encourage pollution prevention. The private sector has embraced pollution prevention but insists regulatory reform and changes to laws are needed before pollution prevention can be fully implemented. This applies equally to the Army and the private sector.

Pollution prevention is the Army's preferred approach to maintaining compliance with environmental laws and regulations. When the Army has options of control or prevention, Army policy dictates use of preventive measures unless mitigating circumstances (such as excessive costs or time and technology limitations) exist and can be documented. Further, all Army missions, operations, and products will incorporate pollution prevention planning throughout the mission, operation, or product life cycle.

Successful implementation of this policy by the Army requires redirection of the technology development program to a pollution prevention orientation. The competition for funding between compliance projects without pollution prevention and those with pollution prevention as an element, or as the total approach, will decrease while the competition for funding among pollution prevention projects not required to achieve compliance should increase as more opportunities are identified. The increased focus on pollution prevention may force changes to the Army's current environmental quality research program staffing and laboratory and center structure to effectively integrate pollution prevention into all research. The Army faces an additional challenge in educating its system development teams to fully integrate pollution prevention into the life cycle consideration of Army materiel. The Army has many existing examples of materiel where treatment, storage, and disposal costs approach or even exceed the acquisition cost of the materiel. The establishment of the Army Acquisition Pollution Prevention Support Office and the Army Industrial Ecology Center are positive actions. If this trends continues to sustain its momentum or gain more momentum, these establishments will become more important to the success of the Army's pollution prevention program.

Cost-benefit analysis will play an increasing role in justifying pollution prevention investments and determining priorities among competing projects. Refinement and exploitation of decision-making tools, such as the pollution abatement and prevention analysis (PAPA) model and Design for Environment (DfE) models, could and should play a greater role in the program.

2.5.2 Trend 20. Landfills

The number of landfills continues to steadily decline while capacity remains fairly constant.

The number of landfills in the United States declined to 3,558 in 1994, a more than seventy-five percent decrease since 1975. Larger, consolidated landfills have replaced smaller, older landfills resulting in a fairly stable capacity.

Army policy guidance states that where feasible, Army installations will obtain solid waste services from municipal utility systems, regional and cooperative systems, private utility systems, and the private sector. This policy clearly reduces the likelihood of the Army adding substantially to its twenty-two sanitary and forty-four hazardous waste landfills (COE 1995). However, the reduction in the number of landfills could reduce or shift the Army's off-site disposal options and increase MSW disposal costs because of longer haul distances or higher tipping fees. The likelihood of a remote Army installation obtaining solid waste services from one of the preferred options is less than installations near cities with a population of at least 25,000. As the number of available landfills become less, there will be increased pressure for on-site landfills.

Like other government utilities, consideration of privatizing solid waste services increased. The Army contracts for landfill operation and garbage collection services at many installations. Oversight of the landfill operation and closure continues to be the Army's responsibility.

The public's perception of large amounts of "open space" on military installations makes installations attractive potential landfill sites for neighboring communities. Installations near growing urban areas with limited available land, high property values, and limited landfill capacity can expect pressure to sell Army land for municipal landfills. Army policy, at this time, precludes the acceptance of off-post waste at an Army-operated landfill.

Assessment of environmental risks and compliance costs must accompany feasibility analyses for new solid waste projects such as landfills, landfill mining, composting, or recycling stations. Army decision-making for new solid waste projects will require increased stakeholder involvement.

2.5.3 Trend 21. Recycling

Recycling continues to grow rapidly and at a slightly faster pace.

America recycled more than twenty percent of its solid waste in 1993. Thirteen states set recycling goals at fifty percent or higher. The public has been a willing participant in curbside recycling programs.

Executive Order 12873 is affecting the Army's procurement by requiring the purchase of twenty-one new products with the highest practical percentage of recovered materials. The extent to which the Army implements programs favoring the acceptance of other "environmentally preferable" products will contribute to the Army's position as an environmental leader. The effort to implement an Army-wide "environmentally preferable" products program must be accommodated within the Army's procurement system.

Recycling programs are commonplace on Army installations, with recycling programs in place at 176 CONUS installations. Twenty-one of the recycling programs are associated with local communities (Fatz 1996). Pressure to exceed current recycling levels may continue to build for Army installations participating in community programs to help meet the high recycling goals established by many states. Recycling initiatives for Army materiel that does not have a significant civilian sector priority will require an investment of Army resources to develop and implement technology developments. Conventional munitions, stockpiled and awaiting destruction, represent a major recycling opportunity and technology challenge.

There may also be delays in the development of Army weapon systems to integrate easily recyclable material (easier disassembly, higher percentage of recycled material, and so forth), such as liquid propellant, into the system while achieving the desired performance and cost

2.5.4 Trend 22. Nonpoint Source Pollution

Nonpoint source pollution control remains the focus of an increasing number of initiatives to improve water quality

Nonpoint source pollution is recognized as a significant contributor to impaired water quality and a source that is not effectively controlled

The Army will have to comply with changes in CWA that require additional monitoring, containment, prevention, storage and treatment of nonpoint source pollution if changes are included in CWA reauthorization and amendments. Likewise, if EPA assigns states regulatory authority over nonpoint source pollution in a reauthorized and amended CWA, the requirements on the Army can differ from state to state and are likely to be variable depending on the receiving body of water and extent of the pollution

In the absence of federal changes to nonpoint source pollution, more states may impose their own regulations, particularly at the watershed level. The potential variability of state regulations will require the Army to plan and respond on a state-by-state basis. The areas on installations that contribute the most nonpoint source contamination are training areas, impact areas, OB/OD grounds, consolidated motorpools, and dropzones. Both engineering and nonengineering (personnel training in and availability of spill control equipment) practices that can prevent or reduce nonpoint source contamination from reaching waterbodies or groundwater, and appear as cost-effective opportunities for increased Army action, should garner a higher priority than currently allocated if there are additional nonpoint source pollution requirements. Increased priority for erosion control technologies and techniques or changes to training land management practices can have a negative impact on readiness.

2.5.5 Trend 23. Pesticide Reform

Pesticide regulatory reform is progressing slowly as debate on pesticide residues increases

Program coordination among the Department of Agriculture, Food and Drug Administration, and EPA improved with the signing of a Memorandum of Understanding for research, development, education, and registration relating to pesticides. Each of these three organizations have some pesticide responsibilities.

The Army is impacted the same as other pesticide users or the consumer of products whose production involves pesticide use and/or residuals. Host country requirements will apply to OCONUS operations and may subject the Army to different requirements than in the United States. The Army must also consider tenants at installations that engage in pesticide use. Changes in legislation or regulation, particularly at the state level, may impact the training and certification of pesticide applicators. Coupled with increased monitoring, particularly groundwater monitoring in agrarian settings, and disposal of revoked pesticides, costs of pesticide application may increase and require more oversight by installation environmental coordinators.

2.5.6 Trend 24. Chlorinated Compounds

The release of chlorinated compounds into the environment continues as a controversial topic as industrial efforts to reduce emissions are gradually increasing

Several international forums called for a ban on persistent chlorinated compounds. Industry responded with greater stewardship of chlorinated compounds and installation of some chlorine-free manufacturing processes.

The impact on the Army of potential restrictions on chlorinated compounds is in the availability and cost of the products the Army procures and manufactures, both CONUS and

OCONUS. Particularly significant would be any restrictions applicable to military-unique chlorinated compounds and chlorinated compounds that play a critical role in Army weapon systems for which there are currently no acceptable nonchlorinated alternatives. Use of chlorinated compounds, including banned ozone depleting substances (ODS), in military equipment may present a problem at OCONUS installations as the host country bans their use. Exemptions for national security purposes may occur, but the effort to file for exemptions would be an added expense. Also, there is no assurance an exemption would be sustained indefinitely. Research and development on alternatives would require large investments over an extended period.

A first step in the elimination of chlorinated compounds is the elimination of ODS, many of which are chlorinated compounds. Class I ODS, defined by section 602(a) of Title VI of the CAAA, calls for their elimination in all facilities by the end of FY03. Army installations are shipping excess chlorofluorocarbon (CFC) refrigerants and chlorinated solvents to the DoD reserve (AAPPSO 1995). Examination of this process for other chlorinated compounds may be valuable in identifying other Army-essential chlorinated compounds that could face elimination. ODS are the only compounds addressed in current policy.

2.6 Conservation

This group consists of six trends that fall under the conservation pillar with a reliance on natural systems. Trends in this grouping have divergent directions and differing intensities

2.6.1 Trend 25 Wetlands

Total wetlands acreage in the United States continues to have a net increase since 1991

A 1994 nongovernmental study that examined both reported losses of wetlands and gains reported an increase in wetlands acreage each year starting in 1991. Upcoming government analyses will either confirm or refute these claims.

The continued increase in U.S. population will squeeze wetlands areas with the possible result of increased pressure to retain all wetlands on federal property. This would include Army installations and can precipitate an expedited schedule for installation mapping activities. Classification of areas as wetlands on Army installations restricts their use. Changes in wetlands classification, expanding or eliminating areas as wetlands, would impact training and other land use. However, with most installations already managing wetlands as restricted areas, the Army can anticipate limited impact. Wetlands classification, however, is a factor at BRAC installations and remediation sites. For BRAC, increased civilian development around an installation can affect any retained wetlands and may possibly lead to more expenditures. For the remediation program, reduced or strengthened remediation requirements at a specific site may surface based on the value of wetlands at or near the remediation site.

2.6.2 Trend 26 Coastal Environments

Coastal areas continue to face severe environmental problems as coastal population increases

Census Bureau population projections forecast seventy-five percent of the nation living in coastal counties by the year 2025. This complicates current actions to address problems associated with combined sewers, nonpoint source pollution, disposal of dredged material, protection of coastal ecosystems, and ocean outfalls.

Legislation and regulations affect the Army's stewardship of coastal areas, such as Aberdeen Proving Ground. Nonpoint source pollution regulation may be addressed for coastal areas more aggressively than other environmental topics at both state and federal levels. The public may increase pressure on the Army to transfer more of its coastal property to nonmilitary use. The public may also want more access to Army installation coastal property for recreational and community development use.

2.6.3 Trend 27 Ecological Risk

Integration of ecological risks into decision-making is consistently increasing, but uncertainty in data and guidance remains a barrier

Discussion of ecological risks continued to increase but at a slightly slower pace than in 1994. The uncertainty associated with the completeness of ecological data and guidance provided when assessing ecological risk hampered swifter integration of ecological risks in the environmental decision-making process.

Ecological risks are a major consideration for the Army because of the Army's large land holdings, approximately 12 million acres (COE 1995), and the high ratio of open space on many Army installations in comparison to most surrounding properties.

Ecosystem assessment and protection do not follow property lines. Therefore, ecosystem plans that include Army real estate holdings could impose restrictions on Army land use and affect the Army's intended land use, most notably, for readiness. The Army must consider the increases in both assessment costs and increased training costs to address environmental considerations.

The Army can expect increased proposals from state environmental departments or federal agencies such as the National Biological Survey or Bureau of Land Management to partner in ecological assessments. These assessments require the commitment of personnel and funding to participate. If the Army does not participate, possibly more restrictive and costly environmental management decisions may be made based on limited data. Therefore, there is a potential cost increase either way.

If ecological risks receive greater consideration in environmental decision-making, the Army can expect to see environmental impact assessments and studies reviewed and increasingly challenged on the basis of ecological risk.

The Army's research budget in this area may be subject to increased scrutiny if Congress reduces the Army's overall environmental research budget. The reduction could occur because legislative and regulatory mandates for ecosystem protection are not as prescriptive as are those for human health protection.

The Army can also expect regional variability in the importance of ecological risks relative to other risks, as demonstrated by results from state and regional comparative risk projects. This will require the Army to consider adjusting the priority of ecosystem protection on a regional basis, as opposed to an Armywide basis.

2.6.4 Trend 28. Cumulative Environmental Impact

The cumulative environmental impact of activities continues to receive greater notice.

The number of environmental impact statements prepared by the federal government remained fairly consistent in the 1990s. The use of geographic information systems (GIS) to evaluate the impact of activities continues to thrive.

State and local governments, interest groups and concerned citizen organizations continue to express concern over the Army's impact on the environment on and beyond installation boundaries. DoD and the Army continue to assess the environmental impact of military operations on DoD property, public land, and natural resources surrounding training areas. The results are used for land use planning and natural resource management. If results are positive, they may help DoD's land acquisition activities; if negative, they can hinder acquisition activities.

As weapon systems become more sophisticated, their cumulative environmental impact will influence system design, testing, operations, and life cycle management, as well as the supporting industrial operations, training, and use of the systems. Public concern over the cumulative impacts of current and future weapon systems will likely continue and result in installation or programmatic level litigation and calls for action. The Army may have to increase public participation and communication prior to commencing actions with a new weapons system that has the potential to evoke a negative reaction at an installation.

Expanded use of GIS technology could require the Army to regularly use the data in assessment of projects. The Army will need to train existing personnel or add staff with appropriate expertise to carry out expanded assessments. Consolidated GIS operations (at regional or Major Army Command [MACOM] levels) could reduce needed equipment and expertise to cover all installations, with work performed on a reimbursable basis.

2.6.5 Trend 29. Natural Resource Damage

Natural resource damage is gaining attention rapidly, but pending court action will influence the magnitude of damage claims.

The Exxon Valdez settlement brought natural resource damage assessment into the spotlight and there are several pending court cases that will influence the size and extent of natural resource damage restoration.

This trend can indirectly affect the enforcement and oversight of all Army activities that potentially adversely affect the environment. The Army will be subject to natural resource damage claims for damage it causes. It will be in the Army's best interest to prevent and mitigate natural resource damages commensurate with achieving the mission. Natural resource management changes should trigger reviews of AR 200-3 (Army Policy and

Guidance on Military Activities) and AR 200-2 (Environmental Effects of Army Actions). Changes to these regulations could result in numerous changes within the Army environmental program affecting personnel, documentation, monitoring, and costs

2.6.6 Trend 30 Biodiversity

The United States continues to hold steady to multinational biodiversity commitments, but domestic efforts are getting weak support

The shift in Congressional majority apparently reduced emphasis on federal biological diversity initiatives. The 1994 Environmental Trends report had biodiversity as a polarizing trend: however, while the United States' commitment to international efforts on biodiversity continues to receive support, domestic biodiversity efforts appear less popular, as demonstrated by a legislative rider that banned the listing of new threatened and endangered species and reduced the FY96 funding for the National Biological Survey (NBS). The outcome of the next federal election is likely to determine if there will be a reversal.

The Army may face biodiversity requirements depending on the status of the NBS and direction that this trend takes. Requirements may likely involve data collection, inventories and mapping. During FY95, the Army, as part of DoD, signed an interagency agreement with NBS to optimize limited resources and improve the relationship between land managers (Goodman 1996). The implementation of the Biodiversity Convention will influence the long-term direction of this trend. If the spirit of the convention perseveres, the impact on the Army will concern land use and the Army's participation in development and maintenance of ecosystem refuges on installations in conjunction with other federal, state, and local organizations. If emphasis declines, investments already made might be negated and future investment curtailed.

2.7 Energy

Two divergent trends are reported in the energy group. Domestic energy policy is moving away from environmentally preferred sources while energy conservation programs continue to grow

2.7.1 Trend 31 Energy production and environmental quality

Domestic energy policy is shifting emphasis away from renewable energy sources; however, international prospects are encouraging

The U.S. energy policy continues to rely primarily upon carbon-based energy sources without much regard to environmental impact. In the United States there has been no appreciable change in per capita total energy use over the last twenty years; however, population increases have accounted for an overall increase in energy use.

The Army's direct energy requirements include vehicular and non-vehicular categories. The vehicle grouping consists of tactical and nontactical vehicles. The energy efficiency of tactical vehicles is an important logistical consideration. The Army continues to support electric drive technology research, but replacement of carbon-based power systems is not projected in the near-term. As the Army slows weapon systems development and acquisition, new systems and replacement of existing type vehicles will slow, maintaining the Army's current vehicle energy requirements, except for downsizing adjustments and changes in the amount and types of training involving vehicles.

For nontactical vehicles, directives to federal agencies to increase acquisition of alternative-fuel vehicles as replacement vehicles in the fleet applies to the Army. Motor pools will have to stock the alternative fuel and provide maintenance for these vehicles through contracted maintenance services, retraining of maintenance personnel, or reliance on a warranty maintenance mechanism.

Post exchange-operated gas stations and nontactical vehicle fuel distribution points may have to expand facilities to store alternative fuels. This may require modifications or additions to current facilities and impact the need for underground or above ground storage tanks and tank monitoring.

If the primary energy conservation requirements and environmental considerations of energy use remain voluntary, the Army will probably need to address innovation mostly in new construction or renovation projects, or justify projects on the basis of cost savings rather than environmental benefits. The Army/DoD has an opportunity to promote energy conservation by including provisions in requests for proposals and contracts that consider energy conservation/environmental protection in evaluating bids and contract performance. Incentives are also possible mechanisms to promote energy conservation among Army contractors.

2.7.2 Trend 32 Energy conservation

Energy conservation programs continue to be rapidly adopted.

All indicators point to continued support of energy conservation by corporations and individual households

Cost savings, rather than environmental benefits, continue to stimulate growth of energy conservation programs. The initial investments required to implement some energy conservation programs may influence the extent to which the Army proceeds with energy conservation. The DoD annual energy costs are approximately \$2.9 billion per year. The Army will most likely benefit from, and monitor, technology transfer opportunities from the private sector regarding energy conservation advances, except for tactical vehicle power trains

Current national energy policy requires federal facilities to reduce energy consumption and costs by 30 percent between 1985 and 2005. Completion of all identified projects that return investments within ten years must occur by 2005. Fort Polk's installation of geothermal heat pumps at 4,000 family housing units is one recent project completed to facilitate attainment of the goal (SERDP 1995a). The Low Energy Model Installation Program at Fort Hood, Texas will demonstrate the effectiveness of a comprehensive approach and serve as a test bed. Military construction specification packages will require change if the Army is to benefit from successes that come from the Fort Hood project.

The Army fuel cell R&D efforts may get continued support because of the potential application of the technology to satisfy installation power generation requirements. However, with no Army CONUS power generating facilities, their value as a secondary or contingency power source could come under inquiry (Eng 1996). Since the Army is an energy consumer, not a generator, conservation represents the Army's opportunity to control energy expenditures when faced with higher unit prices for energy.

2.8 Risk Assessments and Audits

This group consists of six trends that focus on management and tools to analyze environmental hazards. The trends in this group maintained their direction, while the intensities of most increased.

2.8.1 Trend 33 Environmental Audit Standards

Environmental auditing continues its rapid growth as government policy now encourages its use.

In 1995, EPA changed its auditing disclosure policy by reducing penalties for voluntary disclosure of environmental violations. Environmental auditing and reporting by the private sector increased from forty percent of respondents in a 1992 survey to seventy-three percent in 1994. ISO 14000, the international standard for environmental management that includes environmental auditing, is intended for those companies doing business in the international marketplace. It is scheduled for release in 1996.

The Army's environmental compliance assessments are the equivalent of environmental audits. Per current policy, all draft assessments and supporting papers are handled as internal working documents until the report is finalized and marked "For Official Use Only" with distribution handled accordingly.

The Army conducts external assessments on a three year cycle, as a minimum, at installations and includes tenants. Limited environmental assessments are accommodated by the Installation Status Report (ISR), Part II, Environment, for those installations required to file an ISR. Installations that do not file an ISR must perform annual internal assessments, except for years in which they have an external assessment. The ISR, Part II, is scheduled for full implementation throughout CONUS in FY96 and OCONUS in FY98 (DA 1995).

This trend is not expected to change the Army's emphasis on audits, which is already significant. The Army is running near the front concerning audits. The publication of ISO 14000 in 1996 could lead to changes in AEC's assessment protocols once the Army analyzes the two systems and notes the differences. If ISO 14000 is less restrictive than current Army audits, there may be no increased costs. However, large companies doing business with DoD may marginally increase their costs if they adopt ISO 14000.

Federal and state exemptions or reduction in penalties for voluntary disclosure of violations identified as a result of audits may lead to a call for wider and more rapid distribution of the Army's assessment reports. If the private sector releases more information, there will be pressure on the government to follow in the public release of audit information. The Army may need to obtain funding more quickly than the present system permits for noncompliance correction items listed in Installation Corrective Action Plans, documents that follow an assessment. Giving priority to funding noncompliance correction items could

disrupt funding for other planned environmental projects. Also, noncompliance issues would be more visible to the public if disclosed and could make the Army vulnerable to pressure and possible litigation to ensure compliance and correct violations. Most of the state audit privilege laws preclude environmental audits or other voluntary evaluation programs from being used for enforcement or litigation. This state audit privilege is in contrast to EPA's policy that reserves the right to request audit information in some litigation circumstances. Federal law and regulation does not provide this immunity and the federal government is contending on Constitutional grounds a state's authority to grant immunity when the state has been given authority to implement a federal program.

2.8.2 Trend 34 Classification of Hazardous Waste

Classification of hazardous waste remains controversial.

Standardization continued to improve as EPA revised the hazardous waste identification rule. Published at the end of 1995, the rule has yet to undergo scrutiny. Regulations for testing incineration ash were published as an outcome from a Supreme Court ruling that incinerator ash was not exempt from hazardous waste rules.

Publication of the new "mixture" and "derived-from" rules on December 21, 1995 was the major event affecting this trend in 1995. The Army is required to use detailed human health risk analyses to determine when a mixed waste is regulated or exempt from regulation. Depending on the listings, the Army will either face expanded or reduced storage and disposal requirements and costs. Practices that eliminate or reduce hazardous waste increase in their importance with these rules. It is increasingly in the Army's best interest to practice and implement hazardous waste minimization.

On May 11, 1995, EPA promulgated the Final Universal Waste Rule (UWR) that streamlines requirements for collecting and managing three widely generated types of hazardous waste: nickel-cadmium or mercury-containing batteries, certain hazardous waste pesticides, and thermostats. The UWR is not effective in states authorized to administer the RCRA program until the state adopts the rule. Army installations will likely be small quantity handlers and, therefore, be prohibited from disposing, diluting, or treating universal waste. However, they will be required to manage the waste to prevent releases, and label and mark universal waste containers. The adoption of the UWR at state level should streamline installation RCRA programs by consolidating the wastes under one procedure.

2.8.3 Trend 35 Comparative Risk Analysis and Risk Management

Comparative risk analysis use increases substantially

Comparative risk assessment projects are now ongoing or completed in thirty states. A National Association of Public Administrators' report promotes expanded use of comparative risk at EPA. And EPA's performance partnership program with states, although delayed by

the FY96 budget stalemate. includes a prioritization of projects that comparative risk analysis will assist

Increased use of comparative risk analyses, cost-benefit studies, and risk assessments will change the oversight process by Congress in reviewing and approving the Army's environmental budget. The Army should anticipate that any yardstick Congress applies to EPA and other federal environmental programs to evaluate prioritization and funding will concurrently apply to the Army.

To effectively apply comparative risk to Army R&D efforts or compliance project investments, the Army must collect the data needed, most of which is either not readily available or assembled, analyze the data from a risk standpoint, and communicate the results to decision-makers and stakeholders. If the Army's environmental budget for noncompliance projects is reduced the Army can expect a requirement to justify investments and increased competition for resources. Allocating the most resources to projects that address the highest risks is a common-sense ideal. The question is not if the Army will use comparative risk methodology, but how the Army can best apply the approach.

Comparative risk requires the input of stakeholders and typically extends the decision-making process because of the time required to receive and respond to stakeholders issues. It also requires re-examination of new data and requires interactions and communication channels not necessarily already in place or operating. The Army can examine how it currently interacts and communicates with stakeholders for installation restoration and environmental impact statement preparation as a means of developing better communication channels for other environmental programs.

2.8.4 Trend 36 Human Health Risks

Human health risks remain the most critical factors in U.S. environmental policy development, legislation, and regulation

Although the national and international scientific community, many public administrators, and numerous environmental interest groups called for increased emphasis on ecosystem protection, human health risks still carry more weight than ecosystem protection for most environmental policy development, legislation, and regulation. Among human health risks, increased emphasis is now given to risks other than cancer.

Continued emphasis on human health risks coupled with the likely decrease in overall Army environmental spending will make it more difficult for the Army to allocate resources to conservation pillar programs or other ecosystem projects. Any funding reductions in the Army's environmental program are likely to target areas other than human health risks unless the programs are specifically mandated by legislation or regulation or have a high benefit to cost ratio.

Changes in risk assessment methodology will impact the Army in the same way the changes impact other federal agencies with a workforce to protect, industrial facilities to manage, and extensive environmental programs. Assessment of human health risks by the Army will continue in its importance. The Army must be alert to the environmental health issues of new technologies and different uses of existing technologies and materiel. The examination of issues must include the soldier/technology interface throughout the materiel's life cycle under a full range of potential use and possible exposure scenarios. Increased attention on noncancer health risks endured by soldiers, including immunogenic and teratogenic aspects, was promoted by the still-puzzling Gulf War Syndrome.

Increased utilization of human health risk approaches such as Risk Based Corrective Action may have a major impact upon cleanup at Army installations. Use of human health risk, rather than strict adherence to arbitrary, non-site specific cleanup values, could substantially reduce the cost of cleanup.

2.8.5 Trend 37 Cost-Benefit Analysis

Support for the use of environmental cost-benefit analysis has increased dramatically.

The agenda in the 104th Congress included attention on regulatory reform and having the benefits of all regulation exceed costs. The House quickly acted on cost-benefit analysis legislation, however, the Senate has not addressed the issue as quickly. The administration sees a need to integrate cost-benefit analysis into regulations, but does not support prescribed procedures that would slow promulgation of regulations or subject all environmental decision-making to quantitative cost-benefit studies.

The Army can best apply cost-benefit analysis to its discretionary environmental spending (non-mandated compliance) where analyses can demonstrate favorable benefit-to-cost ratios. Such analyses may gather support for projects with near-term benefits that can be directly measured in dollars. Projects with benefits that are more difficult to quantify and/or to measure in terms of dollars will suffer from this approach.

If cost-benefit analysis becomes mandatory for all major Army environmental programs, which is unlikely, there will be requirements to develop protocols and apply the analysis process to all competing programs. If cost-benefit analysis remains an issue for regulatory reform and includes existing regulations as well as future regulations, the Army may find it must comply with fewer EPA and state regulations. However, a favorable benefits to cost ratio for the overall implementation of a regulation may not be economically beneficial for the Army.

2.8.6 Trend 38 Life Cycle Assessment

Use of life cycle assessment is slowly expanding as an environmental practice.

Although no federal law or regulation requires life cycle assessment, its use as a tool in environmental management is gaining popularity, particularly life cycle inventory and DfE concepts. With life cycle assessment incorporated in ISO 14000, it is poised to be a standard environmental practice. DoD and Army procurement regulations require life cycle analyses.

Life cycle assessment as an environmental practice will have major impact on the Army's weapons systems development and industrial activities because it will affect materiel development, design, procurement, use, and disposal. If life cycle assessment becomes widely adopted, either voluntarily by U.S. business or by regulation, it would impact all of the Army's materiel procurement as well as weapons systems development and industrial activities. It would appear logical to tie environmental life cycle assessments to other forms of life cycle assessments that gained popularity in the industrial sector. Life cycle assessment could follow a path like that of TQEM. TQEM is now an integrated part of environmental management. This will require the Army's environmental community to interact more with weapons systems technology developers, program managers, and others in the technology development and acquisition process. The Army can expect communication problems between disciplines and training requirements for the technology developers and others to expand on their understanding of environmental quality management.

2.9 International Activities and Global Problems

This group of trends consists of five trends of international concern to the United States and many other countries. The trends in this group maintained their direction with the intensities of most growing stronger.

2.9.1 Trend 39 Foreign Environmental Requirements

Environmental requirements worldwide continue their gradual increase as does the need for financial and technical assistance.

There are now 172 major international environmental treaties, and over 800 if less binding instruments are included. The Global Environmental Facility has already provided approximately \$870 million, however, environmental funding needs greatly exceed current investments. Only a few international treaties were introduced since 1994 but ratification and implementation of several environmentally significant international treaties is ongoing.

Army environmental policy, when operating in foreign nations, will comply with environmental standards defined in three types of documents.

- Applicable international agreements
- Country-specific Final Governing Standards (FGS)
- Overseas Environmental Baseline Guidance Document (OEBGD), in the absence of FGS

Therefore, international agreements between the United States and a host nation or international agreements to which both countries are signatories, set environmental standards the Army must meet. Host nation environmental laws serve as the basis for FGS. Additionally, international treaties and conventions have the force of law and impact on operational considerations as well as installation management when operating in a host country. As a host country's laws change, the FGS keeps pace with the changes. Environmental compliance assessments are conducted in accordance with country-specific FGS, so changes in FGS trigger changes in assessment protocols and can also change compliance requirements.

Hazardous waste disposal under DoD Directive 6050.16 must meet or exceed the FGS criteria, or OEBGD in the absence of FGS, and otherwise have received concurrence of the appropriate host-nation authorities. When this requirement is coupled with international agreements, it can result in the Army returning hazardous waste to the United States or to a foreign country where the Army can meet the FGS or OEBGD. Hazardous waste minimization programs take on even greater importance when the Army is faced with increased hazardous waste packaging, storage, and transportation costs, as is the case in Bosnia.

The Army may also consider adding a section on environmental laws, treaty signatory status, and considerations to country briefings to assist in operational planning for security and support operations.

2.9.2 Trend 40 Competition for Land, Water, and Other Resources

Population growth continues to apply steadily increasing pressure on land, water, and other resources.

The 1994 world population estimate increased to 5.63 billion. The 1994 decennial International Conference on Population and Development in Cairo and the Beijing Women's Conference in 1995 both increased focus on the effects of population on the world economy and to some degree, the environment. The demand for food and the environmental impact that agriculture exerts on land and water resources is increasing as the harvested grain area per person dropped to 0.12 hectares in 1994 and fresh water scarcity is becoming more pronounced.

The Army may find increasing competition for its land for purposes other than a military installation, both CONUS and OCONUS. The Army may encounter pressure to open installations, or parts of an installation, to the public for recreational or community uses. This may result in increased costs and concern over environmental degradation of the area. The Army, in joint operations, must begin to consider these scarcities in operational planning.

The scarcity of water could result in the Army paying higher prices for water purchased from publicly owned plants and litigation over water rights. Water rights issues for surface water and groundwater have been, and will continue to be, substantial concerns for Western States installations. Water supply quantity and quality will impact the economics of the Army's use of regional or municipal water supply systems. The demand for water by the civilian community served by the systems also serving an Army installation could force the Army into a requirement to develop its own water source and operate its own system. Another possible scenario would be for the Army to find itself forced to transfer or curtail certain activities, such as river crossing training, from an installation because of water limitations or restrictions. Installation master planning is impacted by water resources and wastewater treatment requirements of everyone using or potentially using the same resources and systems.

2.9.3 Trend 41 Sustainable Development

Environmental policies continue their rapid integration into sustainable development practices and industry is beginning to adopt sustainable development

Almost all international gatherings on economics now include sustainable development on their agenda. The President's Council on Sustainable Development is nearing completion of its tenure and will report on domestic sustainable development in early 1996. Industry's

shift to produce less toxic consumer products, reduce toxic emissions, improve recycling efforts, and collaborate on environmentally preferable products and practices, such as alternatively fueled vehicles and sustainable forestry, indicates adoption of many sustainable development concepts.

The impact of sustainable development practices in the United States and throughout the world on the Army depends on how sustainable development is expressed in environmental laws, regulations, executive orders, and international agreements. Beyond imposed requirements, the Army could benefit from closely monitoring sustainable development activities to anticipate their impact on the Army and to take advantage of applying other successes within the Army.

Sustainable development puts emphasis on pollution prevention and efficient use of natural resources and encourages partnerships, goal setting, innovation, and flexibility. Therefore, the Army programs that are aligned with sustainable development, such as Strategic Environmental Research and Development Program (SERDP) research projects and installation recycling programs, are likely to be viewed more positively by decision-makers than other programs. This will likely improve funding for such programs. The Army can also strive for a sustainable fighting force as a corollary to sustainable development. This will result in the Army including environmental consideration in all decision-making and can improve public perception of the Army's commitment to environmental stewardship.

2.9.4 Trend 42. Climate Change

Climate change impacts remain a controversial topic with continuing high levels of research and debate.

Initial reports show 1995 as the warmest year on record but debate over the cause, man-induced or natural, continues. Domestic funding for the President's Climate Change Action Program had a \$4 million rescission in FY95 and faced possible deep cuts in FY96.

Any regulatory actions or executive orders associated with the Climate Change Action Program are likely to affect the Army's greenhouse gas emissions and use of ozone depleting substances. A strategic decision was made to de-emphasize global change in the SERDP. Therefore, if the government steps up its global change R&D, it is unlikely that the Army will have a major performance role or have military-unique substances examined in materiel substitution. The DoD review of military specifications to eliminate hazardous and environmentally harmful materiel and incorporation of performance-based standards for materiel is an ongoing process that will pay long-term benefits.

2 9 5 Trend 43. International Trade Agreements

After recent integration in 1993 and 1994, the environmental considerations of international trade agreements have received moderate attention

The General Agreement on Tariffs and Trade (GATT) and the North American Free Trade Agreement (NAFTA) are the two most significant trade agreements affecting the United States. Each has significant environmental considerations and both were challenged in 1995. Of lesser significance, the Summit of the Americas, held in late 1994, supported sustainable economic development for the Western Hemisphere.

Environmental considerations in international agreements not only have obvious impacts on U.S. forces stationed overseas permanently, such as compliance with environmental statutes, but the agreements also impact deployments, such as the ongoing Operation Joint Endeavor. An example is the Basel Convention. Hungary is a signatory to the Convention, but Croatia and Serbia are not. Hungary is the nearest country with hazardous waste disposal facilities judged as acceptable to U.S. standards, but under the Convention, signatory nations cannot accept hazardous waste from nonsignatory countries. Therefore, the U.S. forces cannot use disposal facilities located in Hungary to dispose of hazardous waste generated in Croatia and Serbia. Logistic plans must take into consideration international agreements. Environmental requirements in international trade agreements can also result in changes to FGS, the standards with which the Army must comply in a foreign country.

2.10 Economics and Costs

The six trends in this group prominently feature either cost or economics. Some trends in other groupings include cost data or economics, but to a lesser extent. The trends in this group generally maintained both direction and intensity since the 1994 Trends Update Report.

2.10.1 Trend 44 Compliance Costs

Compliance costs continue to rise steadily

Federal government and private sector environmental compliance spending has escalated in the United States since the early 1980s to over \$100 billion annually. Private sector air pollution compliance spending is the only area among water, solid waste, and air pollution to decline in the 1990s. To address the increasing burden of environmental costs being passed on to state and local governments, the Unfunded Mandates Reform Act was enacted in 1995. However, acknowledging Congressional concern over the federal government transferring major costs to the state and local government without providing the funding, the law affects only new legislation, not regulation promulgated under existing law.

One impact of continued higher compliance costs the Army may face is that compliance costs will take an increasingly higher percentage of the Army's overall environmental budget, leaving the Army with fewer resources for noncompliance environmental expenditures, including pollution prevention, conservation, or any environmental investment that goes beyond compliance and is not specifically required by law or regulation.

As private sector compliance costs continue to increase, the Army can expect these costs will be passed on by government contractors and reflected in higher acquisition costs. Increases in compliance costs should contribute to the support of studies examining more cost-effective compliance technology for the Army's unique requirements. Lowering the cost of environmental compliance is a significant factor in many of the Army/DoD projects in the compliance and cleanup pillars technology programs (DoD 1995a).

Extension of EPA's Environmental Leadership Program, a program that examines the costs of compliance in the private sector to federal facilities, can provide the Army an opportunity to work more closely with EPA in forming specific compliance programs for military installations. If pursued, this program can significantly save base operations funds and perhaps ease training restrictions, both being positive impacts on readiness.

2.10.2 Trend 45 Remediation Costs and Spending

The estimated cost to clean up the nation's hazardous waste sites continues to slowly rise and is a target of significant debate.

The estimated cleanup costs at Department of Energy (DOE) sites, which may exceed \$230 billion over the next eighty years, represents the nation's costliest remediation program. The cost estimate for DoD's cleanup which is over \$26 billion, is estimated at less than ten percent of DOE's costs. Congressional funding of the Supertund program is declining, with the proposed FY96 authorization approximately twenty-five percent below FY93 levels. Reform of Supertund has been a topic of debate in Congress with changing the liability and adjusting cleanup levels as two primary issues.

Concern over the continued high cost and slow pace of site cleanups, coupled with considerations of reduced environmental spending and the relatively lower health risks assigned to many sites in comparison to other environmental risks, may further decrease the outyear funding for the Army cleanup program. Changes in Supertund could allow the Army to reduce the average site cleanup costs if cleanup standards are relaxed. Continued pressure to remediate BRAC sites rapidly will undoubtedly cut into funding appropriations for sites on active installations. The Fast-Track Cleanup program may be a model for all cleanup activities.

As long as cleanups at Army sites maintain the position as a major environmental expenditure (\$546 and \$495 million in FY95 and FY96 respectively) (DoD 1995), cleanup and compliance combined will limit the Army's pollution prevention and conservation programs because the external and internal advocacy for the latter programs cannot match that for cleanup and compliance.

Congressional oversight of DOE's environmental management program can hinder the Army. If Congress is not satisfied with DOE's management, Congress could, because of similarities between DOE and DoD, decrease funding and increase oversight of the DoD program. Increased average site cleanup costs will extend the Army's cleanup program if funding increases are not forthcoming in upcoming years. Not meeting schedules or commitments may lead to increased oversight and public concern.

2.10.3 Trend 46 Waste Disposal Costs

Larger, consolidated waste disposal facilities are emerging as costs continue to slowly rise.

Landfill disposal costs increased nearly twenty-five percent from 1990 to 1994. The cost increase in 1994 was less rapid than increases reported in 1993. Regional cost variations continued. Solid waste incineration tipping fees declined for the second straight year, but

hazardous waste incineration fees remained expensive as the industry attempts to rebound from increased regulatory activity, overcapacity, and concerns over emissions' health effects.

The Army's MSW disposal problems are similar to municipalities in many respects except the Army typically has more land available for landfills or landfill expansion than most municipalities. At installations facing increasing disposal costs, waste reduction and recycling become more attractive management options for the Army to consider. Solid waste composting and landfill mining, two waste management techniques gaining popularity in the private sector, are options the Army should consider for feasibility.

The 176 CONUS Army installations with recycling programs (twenty-one are in partnership with a neighboring community) will continue to receive support within the Army because they are a visible demonstration of wide participation in environmentally friendly activity. Market availability and market prices for recyclable materials will impact the economics of installation recycling programs and determine where they are cost effective. Isolated or remote installations are likely to continue to have difficulties finding cost-effective markets for their recyclable materials. Finally, some neighboring communities will increase their pressure on Army installations to use Army land or existing Army landfills for waste disposal as they face higher disposal costs or their landfills approach capacity or are closed. The Army may want to consider revision of the policy that restricts landfills on Army installations to Army use.

2.10.4 Trend 47: Market Incentives

Environmental market incentives continue to steadily increase in popularity and appear poised for expansion

Incentive programs experienced sustained growth and now include air emissions and trading, nonuse tax exemptions for sensitive areas, and wetlands banking. More and different incentives for environmental protection are being examined as part of EPA's review of environmental regulations.

The Army has the opportunity to participate in permit trading, emissions banking, and other incentives programs. If it does not participate, it will be a missed opportunity that will result in increased costs for the Army.

This trend supports emphasis on pollution prevention and continued interaction with regional, state, and local regulators and initiatives. Regional, state, and local activity in these areas will cause the Army to either pay greater attention to its emissions or be affected economically. It will be difficult for the Army to maintain claim to environmental stewardship and leadership if it does not participate in incentive programs.

2.10.5 Trend 48 Privatization

Privatization's popularity is slowly gaining momentum in the United States

The National Performance Review and increased emphasis on smaller government continue to be catalysts of this trend that maintained its direction and pace. In comparison to Europe, the movement towards more privatization of government operations is slower in the United States. The first of many predicted sales of federally funded municipal wastewater treatment plants occurred in 1995. Privatization of the National Aeronautics and Space Administration's (NASA) space shuttle operation and portions of DOE's energy research and waste cleanup and disposal programs is planned.

This trend is most likely to impact the Army by an increased rate of contracted services in programs previously performed in-house. Services that have little direct impact on military readiness are probable targets. The Army could include programs such as environmental quality for increased privatization because there are strong existing contractor capabilities in many areas of environmental quality. Army environmental staffs will need to be capable of monitoring contracted activities. If Army downsizing continues, it may be increasingly attractive to have contractors carry out work in government owned facilities at Army installations. This approach helps to maintain the facilities in a state of readiness for possible mobilization, gets use out of the facilities, and avoids a negative economic impact on the neighboring community.

The life cycle cost analyses performed to connect to regional or municipal water and wastewater systems will be changed by privatization. BRAC decisions also impact the economics of privatization. It may not be cost effective to operate the remaining infrastructure on installations where the Army is no longer a major tenant, such as the Presidio. The Army is conducting, and will undoubtedly continue to conduct more studies on utility privatization if privatization continues to be demonstrated as cost effective. Fort Ritchie and Fort Pickett are the only CONUS facilities currently operated by a contractor (Eng 1996). Fort Gordon is undergoing evaluation for privatization.

Privatization may negatively impact readiness if utilities are not provided due to strikes, bankruptcy, public relations issues, and so forth. The subsequent lack of potable water, wastewater treatment, or other services can have a major short and long-term readiness consequence for an installation.

2.10.6 Trend 49 Environmental Technology Development and Export

Emphasis on developing and exporting environmental technology continues its solid growth despite potential shifts in federal policy and support

The administration's focus on environmental technology as an important component in the nation's economic growth continues. Federal funding of environmental research and

development continues to increase, roughly \$4.2 billion in FY95, but the rate of increase is declining in terms of constant dollars. The number of innovative environmental treatment technologies continues to grow. However, two programs that promote development of new technologies, EPA's Innovative Technology Program and the Department of Commerce's Advanced Technology Program, are under scrutiny by Congressional members trying to reduce the federal budget. Some members of congress believe the federal government should not be involved with what they claim is an inherently private sector activity.

Reduction in environmental technology R&D funding by the federal government will reduce the availability of technologies the Army can use, or modify for use, to satisfy its environmental needs unless the private sector fills the R&D funding gap. Technology development with the largest market potential and profit obviously is most attractive to the private sector. Therefore, technology development for Army-unique requirements is less attractive to private sector developers because of the smaller market. The pattern of environmental technology R&D funding in other federal agencies will probably influence the Army funding. The Army can expect reduced support for environmental technology programs if programs in other federal agencies are reduced. Addressing longer-term needs will become increasingly difficult if emphasis is placed on near-term results and cost savings in the short-term.

Partnering, although widely advocated, may become more difficult if funding is reduced and partners turn to supporting their core programs, in-house staff, and facilities. Technologies with high payoff potential and application to high priority, Army-unique requirements impacting readiness have the best chance for support.

2.11 Interest Groups and Public Opinion

The four trends in this group indicate public sentiment toward environmental issues and the activities and status of interest groups. Three trends maintained their direction and intensity, while one trend, environmental equity, decreased in both direction and intensity

2.11.1 Trend 50: Public Opinion

Environmentalism continues to mature and struggle to retain public recognition of environmental protection as a very important national problem

Public opinion polls in the United States reflected the maturing of environmental protection as only sixty-five percent of those polled in 1995 considered the environment as a "very important" issue compared to eighty-five percent in 1993. At the same time, the majority of Americans, sixty-two versus forty-five percent in 1993, now rate environmental quality as improved. Concern for environmental issues continues, but other national issues such as health care, welfare reform, and the federal deficit took the limelight away from the environment. The public registered some concern over proposed bills contending they would seriously roll back many of the environmental gains achieved over the last twenty-five years

National and regional public opinion on environmental issues influences the attention and actions of Congress and state legislatures resulting in hearings and the introduction of bills and enactments. In contrast to national or regional public opinion, local opinion can reflect great public anxiety on an issue not in the national spotlight. Chemical agents and munitions demilitarization remains a polarizing issue around the eight proposed U.S. disposal sites. While chemical agent demilitarization has unique characteristics that contribute to the public's anxiety, it also has the potential of a wider poisoning of public opinion against any Army activity (environmental or nonenvironmental) at these installations and beyond

Proposed environmental actions, particularly at the state and local levels, require earlier and increased public participation in decision-making, including permitting and facility siting. This involvement may protract actions and require considerably larger investments in communications, public meetings, and interaction with stakeholders. Army environmental staff will need the skills or the support to accomplish this involvement

2.11.2 Trend 51: Environmental Interest Groups

Environmental interest groups' membership and contributions continue to increase

Membership and revenues increased in thirteen of the seventeen major environmental groups in the United States comparing 1994 to 1993. Groups featuring land/habitat acquisition and conservation experienced the greatest growth in 1994, ranging from ten to thirty-three percent increases in membership and eleven to fourteen percent increases in revenues. Groups' efforts to cut administrative expenses and refocus their missions were successful in

attracting new members and additional funding. A counter-movement of anti-environmental groups has also become more active in attempts to influence environmental policy and offset the influence of pro-environmental organizations.

Environmental interest groups help to shape the public's opinion toward the Army and the Army's environmental program. This in turn affects policy decisions, legislation, regulation, and enforcement affecting military bases. Local environmental groups, or national groups with local affiliations, with members from communities neighboring Army installations, can play an important role in getting local and state government actions that directly increase the monitoring, reporting, and compliance requirements of military installations. If state and local governments are given greater responsibility and authority for environmental matters, the importance of the influence of local groups will increase. Army installations will benefit from establishing and maintaining cognizance of local and regional groups' environmental agendas and informing these groups of the Army's environmental programs and plans.

The impact of national and international environmental interest groups on the Army is reflected mostly in litigation over environmental legislation or regulations or lobbying for the enactment, defeat or provisions of a bill. Monitoring of these groups' activities and obtaining feedback on their environmental issues of concern is advisable to ensure proactive measures can be taken.

2.11.3 Trend 52: Environmental Seals

Consumer acceptance of environmentally friendly products continues its steady growth as governments strive to develop uniform criteria for environmental marketing claims

Although there was a drop in the rate of new products introduced with environmental claims, from thirteen percent in 1993 to eleven percent in 1994, consumers still consider them important as long as the products work as stated and are competitively priced. Sixteen states had environmental marketing laws and five had pending legislation. The EPA released proposed guidance on the acquisition of environmentally preferable products and services.

This trend impacts the Army in three ways. Army personnel will probably display proportionately similar reactions to environmental advertising and labeling as the nation as a whole. Secondly, the Army may find that increasing environmentally friendly procurement beyond that already mandated could improve its environmental leadership image with the public. Finally, Army personnel and their dependents may show more personal initiative in preventing or reducing the negative environmental impact of their work.

2.11.4 Trend 53. Environmental Equity

Environmental justice attention slows significantly, compared to 1994, as it moves from a high visibility, standalone topic to a topic integrated into environmental management practices

Environmental equity, reported in the 1994 Trends Update Report as rapidly gaining momentum, is becoming integrated into other environmental management practices. Although there is still interest and activity in the topic, reflected in EPA's Environmental Justice Community/University Partnership Program, other issues have taken its spotlight. Also, several credible studies demonstrated that environmental equity was more linked to area economics than ethnic makeup. Little Congressional activity was reported on environmental equity legislation and the integration of environmental justice into other programs reduced its visibility but may have ensured its permanence.

Environmental justice has been recognized as an aspect of the brownfields program because of the urban environment and the association of persons of low income and minorities in proximity to many brownfield sites. For the Army, it is axiomatic that cleanups at BRAC sites are analogous to brownfields. Local communities want cleanups to be accelerated and the installation or brownfield to contribute more to the area's economy.

Including environmental justice considerations in environmental impact statements and assessments prepared by the Army will be appropriate. This requires that demographic information be collected and used. Census data should be adequate for initial evaluations.

Actions by Congress or additional Executive Orders could establish additional environmental justice requirements for the Army. At this time, however, environmental justice does not appear to be a standalone issue for action by Congress or the administration.

2.12 Education and Employment

The two trends in this group maintained their direction and only slightly changed their pace since reported in the 1994 Trends Update Report

2.12.1 Trend 54 Environmental Education and Employment

Environmental education programs continue to consistently grow as employment opportunities rise.

Environmental education programs, in the K-12 level particularly, have expanded as a result of the National Environmental Education Act of 1990. Public participation in environmental decision-making and public access to environmental information has also grown as the government now solicits greater public participation in developing environmental policy. Employment opportunities available in the environmental field increased but not as rapidly as in the 1980s

As environmental employment opportunities increase, the Army may find it more difficult to recruit and retain environmental staff. However, larger enrollment in environmental programs may offset the increased demand. The privatization of Army environmental functions would shift some staffing needs from the Army to the Army's contractors.

Any increase in the environmental literacy of the U.S. population will probably help to sustain support for environmental programs at all levels and contribute to increased public involvement. If soldiers enter the Army with a better environmental awareness, they could become more active participants in environmental programs. The Army Environmental Training Support Center estimates that the Army offers 180 environmental courses per year (Mitchell 1996). This training and the use of unit environmental compliance officers contributes to increased environmental awareness in the total Army.

As education on environmental issues increases at all levels, the Army leadership can be expected to be more environmentally sensitive than in the past.

2.12.2 Trend 55 Certification/registration

Certification and registration programs for environmental professionals continue to increase while state licensing has remained limited.

Although a national professional certification does not yet exist covering all environmental professionals, the number of state agencies requiring a certificate of qualification continues to slowly build. EPA, OSHA, and the Department of Transportation have requirements for more than one hundred specific environmental training programs.

The Army should track further developments in certification of environmental professionals because it affects the qualifications of Army environmental staff. This has training implications and affects job descriptions, grade structure, and recruitment. A standardized environmental certification program within the Army would continue to be attractive regardless of the growth of privatization and contracting of environmental services within the Army because it would standardize training across all locations for the same certification and allow Army personnel to transfer between installations in different states and retain their certification. It may require the Army to develop policy on and select among the certification programs/standards that it will require for environmental staff.

In coordination with the Office of Personnel Management, the use of certification as a quality ranking factor during recruitment can benefit the Army by increasing standardization and reducing training requirements.

2.13 Environmental Issues

The 1995 Trends Update Report analyzed ten environmental issues that can impact the Army. The following subsections provide a brief summary of the issues and their potential impacts on the Army.

2.13.1 Environmental Hormones

The reports of hormone-related toxicants, also referred to as "endocrine disruptors," in the environment continue to expand. The reports generate scientific, public, and political interest and debate. There is no federal legislation or regulation specifically addressing hormone-related toxicants in the environment. Uncertainty and controversy concerning hormone-related toxicants prevail. Hormone-related toxicants in the environment typically include all xenobiotic substances in water, food web components or other environmental media that act upon endocrine tissues, hormones or receptors, producing adverse effects on reproduction, development, immune systems, nervous systems, or other biological systems or processes.

If the findings are that certain chemicals the Army uses extensively or in critical application are endocrine disruptors, the Army will face examining alternative chemical development or use and reducing or eliminating exposures and environmental releases of these chemicals. If there has been long-term, wide exposure to these chemicals by military personnel, the impact could parallel that of Agent Orange.

The Army can anticipate the requirements of additional toxicological testing for new chemicals, or chemicals proposed for new uses, if the chemicals have similar characteristics to chemicals implicated with hormone-related toxicological effects. This testing will extend development time and could lead to special controls or restrictions on the chemicals.

Findings could also affect site cleanup priorities and remedial action levels and impact hazardous waste disposal option methods, controls, and monitoring.

2.13.2 Electromagnetic Fields

Health and environmental effects of electromagnetic fields (EMF) continue to receive attention and speculation. Certain types of cancer, primarily leukemia and brain cancer, have been suggested as being associated with EMF exposure. EMF health and environmental concerns focus mainly on 60 Hz frequency, referred to as extremely low frequency, and the wireless communication devices typically in the 800-900 MHz range.

As the Army increases soldier exposure to EMF by the introduction of new communications equipment and other equipment, the finding of a clear cause-effect relationship between EMF and adverse health effects could jeopardize the fielding or restrict the uses and exposure of EMF-producing equipment and reduce readiness.

The location of facilities in proximity to EMF at Army installations could also impact the facility's occupancy and use. The uncertainty about EMF health and environmental effects could become a significant factor in materiel development and fielding

2.13.3 Fiberglass and Ceramic Fibers

Fiberglass and ceramic fibers have many of the same characteristics as asbestos, a known carcinogen. Ceramic fibers production grew significantly since commercial introduction in the early 1970s. In 1990, refractory ceramic fibers production in the United States was approximately 80 million pounds (59 Fed Reg 13298). The human health concerns for ceramic fibers are mostly associated with the workplace at this time. However, as fiberglass and ceramic fibers use and disposal increase, the concern over their environmental risk will also increase. The prevalence of fiberglass in buildings and the increasing use of ceramic fibers in military equipment escalates the health effects concern in the workplace and the general environment.

Features of advanced ceramics, including low weight, great strength, and insulation properties, make them attractive for use in Army equipment. The life cycle health and environmental considerations of ceramics and fiberglass will impact the Army's use of these materials in new equipment and affect the demolition and disposal of items and facilities containing these fibers.

The health and environmental effects are not likely to totally eliminate these fibers from use. But, they may require special controls and worker protection for manufacturing and handling, and disposal of materiel and generate restrictions on certain applications and uses.

2.13.4 Natural Bioattenuation

Natural bioattenuation, also called intrinsic bioremediation, is a plume management strategy that has been gaining acceptance in the private sector and has been used by the Air Force on groundwater contaminated with benzene, toluene, ethylbenzene, xylene, and trichloroethylene. It has gained enough attention to be the subject of several international symposia. For natural bioattenuation to be an attractive remediation approach, the cost of conventional remediation of the contaminants must be high, the contaminants must be easily biodegradable, aquifer conditions must be appropriate, there are no potential receptors either on or off the installation, and the timeframe required for natural bioattenuation must be acceptable. The preambles of both the National Contingency Plan (NCP) and the subpart S rule address natural bioattenuation, so it is not new. NCP defines it as a remedy based on natural attenuation where biodegradation, dispersion, dilution, and adsorption within a reasonable timeframe achieve remedial goals.

If the acceptance of natural bioattenuation applications at cleanup sites is broadened, the Army could reduce remediation costs substantially at selected sites and impacts both required funding and technology development. The pressure to complete site cleanups quickly

conflicts with natural bioattenuation, which typically requires more time than other technologies. The 1995 Record of Decision for chlorinated hydrocarbons and explosives in groundwater at Sierra Army Depot, California, marked the first use of this technique at an Army installation.

The Army cannot use this technique for sites with a mixture of contaminants, some of which are not effectively bioremediated such as trichloroethylene.

The Army can expect to face public skepticism to this treatment approach unless the public is informed and involved throughout the remedy selection process. The method appears most attractive at sites on active installations without off-post groundwater migration or ongoing groundwater withdrawals. For example, in an AEC survey, groundwater was a primary, secondary or emergency source for potable water at eighty-five of 228 CONUS installations surveyed. This limits the opportunity for natural bioattenuation use as does the nature of the contaminants.

2.13.5 State Level Regulatory Reform Limiting State Regulations to Federal Levels

Environmental regulatory reform is proceeding at a faster pace at the state government level than at the federal level. Although none of the states have yet enacted laws limiting their authority to promulgate environmental regulations more stringent than their corresponding federal provisions, bills were introduced and are under consideration in Utah, Maryland, Colorado, and California that would accomplish this. These bills address the subject to varying degrees and propose various exceptions. Opposition to these bills centers around their preventing states from developing more stringent rules for important environmental programs within the state.

Complying with variable state and local environmental regulations that are more restrictive than federal standards precludes the Army from applying the same technology and using the same design on an Armywide basis unless the selection and design used for all locations meets or exceeds the most stringent state requirements. The Army's environmental monitoring and permitting requirements vary by state. Nationwide standards would simplify the Army's environmental compliance significantly. Most of the proposed state laws include provisions for more restrictive standards only if the benefits exceed the costs or special conditions within the state require it.

Keeping track of applicable state and local regulations and complying with them is a major task for installation environmental coordinators. Regional support centers can monitor and track state environmental regulations within their regions and provide relief to installation environmental staff. However, monitoring and tracking at the regional level must provide visibility to all applicable regulations, including local regulations. If devolution from state to local governments continues and gains momentum, the importance of local regulations will increase with a concomitant increase in cost to the Army to stay current in program planning and implementation.

2.13.6 Emerging Pathogens in Drinking Water

In the past, Americans were not very concerned about the microbiological quality of their drinking water as delivered by their public systems. Concern over chemical contaminants in drinking water causing adverse health effects, particularly cancer, had a strong influence in the initial enactment of SDWA in 1974 and its 1986 revision. However, determination that *Cryptosporidium* in Milwaukee's drinking water caused an estimated 400,000 cases of acute gastroenteritis and about one hundred deaths in 1993, raised the public's concern and attracted the scientific community's attention. The Milwaukee outbreak coupled with residents in both Washington, D.C. and New York City being advised to temporarily boil their water due to heightened risk of microbiological contamination intensified concern over microbiological quality of drinking water.

This issue has the potential to require the Army to reassess treatment and distribution systems at the 425 potable water and wastewater treatment plants serving Army fixed installations throughout the world (COE 1995). Detection of these emerging pathogens in field water treatment, storage, and distribution systems during foreign and domestic security and support operations should also be considered.

Changes in treatment and monitoring requirements could be required to provide safe water in the field and garrison. Systems now considered adequate may require modification and operational changes. Changes to source protection for ground and surface water supplies could curtail Army activities at installations within watersheds used as drinking water sources. Monitoring changes will require the Army to either contract out work or add laboratory capabilities and staff to meet requirements for expanded microbiological testing.

For field water, the question of disinfection policy will require examination based on pathogen occurrence, disinfectant by-product toxicity, treatment unit performance, and treated water handling and storage. Additional costs may be incurred and technologies may be required to maintain a healthy force.

2.13.7 Chemical and Biological Agent Terrorism

Several incidents occurred recently involving biological and chemical agent use or plans for use by terrorists in the United States and throughout the world. In August 1994, the Federal Bureau of Investigation arrested members of a group calling itself the Patriots' Council in Minneapolis, that produced a neurotoxin. On March 20, 1995, members of a religious cult, Aum Shinrikyo, used sarin gas at a central Tokyo subway station that served Japan's major government agencies. The attack resulted in twelve deaths and more than 5,000 injuries. An inefficient delivery system used by the terrorists saved many from more serious injury or death. Aum Shinrikyo also apparently investigated the acquisition of nuclear materials and biological agents, as well as chemical agents. This is believed to be the first terrorist use of a chemical weapon of mass destruction on a civilian population.

One impact of this issue is the potential for the civilian community to call upon Army personnel to react to terrorist incidents when they happen. Although there is less emphasis on the military's support for emergency response in civil hazardous waste spills, the Army's expertise and resources to respond to both chemical and biological agent terrorist acts do not exist in the civilian community. Training of Army personnel to facilitate their participation in joint response activities is a probable requirement.

Army installations, possibly to a greater extent in foreign countries, could be the target of terrorist attacks that include chemical and biological agents. Vulnerability assessments may be appropriate and corrective actions required. Increased physical security of water supplies and treatment works, improved sensors and monitors, and improved emergency response action plans and preparedness all appear advisable.

Other law enforcement, intelligence, and emergency response agencies and organizations (those assigned the response/reaction mission) may call upon the Army's expertise in chemical and biological agents to conduct research, training, and assessment of environmental and human health impacts applicable to this issue. Agreements and protocols prepared for chemical weapons treaty verification may serve as a starting point for planning purposes.

2.13.8 Triazine Pesticides

EPA's receipt of more than 80,000 comments in response to the notice initiating a Special Review in November 1994 of three triazine pesticides (atrazine, cyanazine, and simazine) indicates the concern and controversy surrounding these pesticides. On August 17, 1995, a private nonprofit interest group, the Environmental Working Group (EWG), issued "Weedkillers by the Glass" (EWG 1995), a report calling more attention to the presence, concentration levels, and health risks of these herbicides in nineteen midwestern public water supplies. The EWG report was picked up by the popular media, producing more public concern. The report was silent on the fact that EPA had reached an agreement on August 2, 1995, before the release of its publication, with the cyanazine manufacturer DuPont to phase out all cyanazine sales in the United States effective December 31, 1999.

Restriction in the use of triazine herbicides on Army land could increase garrison maintenance costs or require changes to training land management techniques. The presence of these pesticides in Army installation water supplies could require development of an alternative source or additional treatment.

Increased attention and concern could extend to other pesticides in drinking water and could result in restrictions on the Army's use of pesticides and require the monitoring and treatment of nonpoint source discharges containing pesticides, as well as additional monitoring and treatment of drinking water. Further control of herbicide use on training areas could occur. If the Army must use less effective herbicides, maintenance costs would increase.

2.13.9 Fine Ambient Airborne Particulate Matter

Sections 108 and 109 of CAAA govern the establishment, review, and revision of the U.S. National Ambient Air Quality Standards (NAAQS). Section 108 requires EPA to list pollutants reasonably anticipated to endanger public health or welfare and to issue air quality criteria for these pollutants based on the latest scientific information. Section 109 requires EPA to periodically revise the air quality criteria to protect sensitive population groups from adverse health effects with an adequate margin of safety, and to set secondary standards to protect against welfare effects, such as impacts on visibility and crops. Fine ambient airborne particulate matter, below 2.5 microns in diameter, has become an increasing concern since it can disrupt gas exchange between air and the bloodstream in the lungs.

Regulatory restrictions centering on fine particulate matter could require the Army to replace or rebuild many of its diesel engines. Although the Army could apply for tactical vehicle exemptions and probably get them, there would probably be increasing pressure for the Army to restrict the operation of diesel powered equipment and vehicles in or near nonattainment areas. This in turn could restrict training operations and impede readiness activities. It would apply to diesel engines used for equipment other than vehicles, such as generators.

Advancements in diesel engine particulate matter emission control will take on greater significance by the diesel engine industry. If advancements affect either fuel efficiency or power, the Army will have to assess their impact on military equipment performance, operational costs, and logistical requirements. Research and development, acquisition, maintenance, and use of equipment could all face more stringent emissions standards, backed up by penalties. With the Army's aging truck fleet, particularly in the Guard and Reserve, replacement or rebuilding diesel engines represent an enormous cost.

Smoke and obscurant operations may also be affected by increased emphasis on the environmental health consequences of particulate matter, with restrictions or limits on its use detracting from readiness.

2.13.10 Women's Health Initiatives

On numerous instances, research has ignored or postponed women's health issues. A major gap exists in medical knowledge since research concentrated on middle-aged white males. There has been a call for more attention to women's health, including the environmental contributors to women's health problems.

The percentage of women in the total Army, their potential chemical exposure, and the work conditions make women's health an important military subject. Findings of research will influence assignments and utilization of women in the military. Unless separate findings support research on aspects unique to military women, the Army must extrapolate from women's overall health research to military women. The unique environmental contributors to

health effects, such as hazardous substance handling and exposure to EMF or smokes, and obscurants, that affect military women can result in increased limitations on assignments and utilization or, conversely, may eliminate restrictions currently in place that are thought to be necessary to protect women.

2.14 Public Opinion

The 1995 Environmental Trends Update Report analyzed domestic and foreign public opinion. The impact that the public opinion results can have on the Army are discussed in the following subsections.

2.14.1 Domestic Public Opinion

The Wirthlin Group conducted an independent survey in August 1994 to solicit a ranking of environmental problems in the United States. A comparison with similar data from 1992 shows a slight reorganization of priorities. While water pollution and toxic waste are still at the top of the list of concerns, concern about conserving our natural resources passed air pollution and solid waste in importance. In addition, the importance of finding alternative fuels gained and global issues dropped. Several other recent surveys continued to assess various environmental problems to determine what Americans considered to be the greatest environmental threats. These surveys confirm the decline in concern over air pollution. Pollution of the nation's rivers, lakes, and streams is still considered the greatest danger and a slight drop in concern over the greenhouse effect was evident, while the use of pesticides and chemicals in farming continued to hold its place.

The reported increase in public opinion concerning conserving natural resources and open areas indicated by the Wirthlin Group survey may have the greatest overall impact on the Army. Any attempts by the Army to acquire additional land for training or ranges, or any uses that would restrict public access, may meet with greater public opposition or support. However, overall national opinion is not as relevant as is local or regional opinion regarding the activities at a specific installation. For example, if degradation occurs at an installation due to Army training, opposition may be encountered. If restrictions on land use are made for the conservation of natural resources, public opinion may be supportive. Therefore, factors such as the present land use, economic implications of the Army's action on the community, communications with the public, and the positions of local politicians on proposed actions by the Army can impact local public opinion significantly, which then rebound on the Army. Additionally, national environmental interest groups do not appear to address local issues unless they have precedent-setting implications.

The public's continuing high priority given to water pollution is likely to put pressure on Army installations that contribute significantly to nonpoint source pollution to treat or reduce the pollution. Installations using municipal type sewage treatment plants in good operating condition or installations connected to regional treatment plants are not effected by the increased concern over nonpoint source pollution.

Although public opinion has remained consistently supportive of increased government spending for environmental protection and tougher environmental laws, regulations, and enforcement, the public appears not to consider an elected official's or candidate's environmental record as an important factor in voting decisions. If the Army sees budget

reductions for environmental programs imposed in appropriations that affect compliance and conservation the Army can anticipate encountering negative public opinion regardless of the fact the Army's requests were not approved by Congress.

Public opinion support for shifting more environmental responsibilities from the federal to state and local governments can potentially cause significant differences in environmental requirements at installations. The greater the extent of the shift, the more the Army will need to interact with state and local environmental offices and respond to their actions. The lower the level of government, the greater the potential for influence by public opinion. The opinions of those in the community influence local politicians partly because of the increased accessibility the public has to them for direct face-to-face dialogue

The public's distrust of the federal government is a factor the Army must recognize and work to minimize or change. This is most effectively accomplished at the installation level for environmental matters, although any action by the federal government that contributes to the distrust impacts all of the government's activities to some degree. If the DoD and Army continue to foster distrust with Congress as well as the general public on health and environmental issues, as evidenced during the investigation of Gulf War Syndrome and possible chemical agent exposure, more staff time and funding will be required to execute environmental programs

2.14.2 Foreign Public Opinion

International public opinion on the environment demonstrated that people in both developing and industrial countries perceive that environmental quality continues to worsen and express substantial concern about environmental quality in general, as well as a wide range of specific environmental issues. The data indicate a willingness between countries to accept responsibility and pay for worldwide environmental quality and people generally recognize government's inherent role in addressing local and national environmental issues and a mutual role of strong international agencies in resolving transnational issues (Bloom 1995)

Public opinion in Germany would appear to have a greater likelihood of influencing political action at all levels of government than does public opinion in Japan, Italy, Panama, South Korea, or Turkey. The distribution of environmental responsibilities to levels of government below the national level is a factor affecting the public's influence. Public opinion could impact American forces in host countries by influencing the renegotiation of Status of Forces Agreements and changes to the FGS. Changes that could possibly occur and affect training land use, unit stationing, or operational restrictions can have significant impacts on readiness.

Public opinion in a given host nation influences the nation's entry into international environmental agreements which place requirements on the Army's activities in the host country, even if the United States is not a signatory to the agreement. Japan, Germany, and

Italy have been active signatories to international agreements not directly affecting or including the United States. Germany and Italy are European Union (EU) members. Public opinion in Germany and Italy supports full participation in EU, including adoption of the environmental management standard, ISO 14000.

2.15 Environmental Interest Groups

The 1995 Environmental Trends Update Report reported on the activities of domestic and foreign environmental interest groups. The impact that their activities can have on the Army are discussed in the following subsections.

2.15.1 Environmental Interest Groups in the United States

Most of the seventeen major environmental groups showed significant growth in 1994. Compared to 1993, when these groups saw no net gain in membership, the groups analyzed experienced a 9.7 percent overall net gain in membership in 1994. Two groups, National Wildlife Federation and National Parks and Conservation Association, each realized a thirty-three percent increase in members since 1993 and five groups added eight percent or more to their membership.

Three groups experienced a drop in membership. Greenpeace membership dropped by 5 percent (a 90,000 member loss). The Wilderness Society lost 18,000 members, and Earthwatch was down 15,000 members in 1994. Membership for the remaining seven groups either increased by less than eight percent or was maintained at the 1993 levels.

The trend of environmental groups diversifying their interests continued in 1995. Groups focus on issues that help them retain and gain membership and increase contributions. Issues with broad appeal such as ecosystem management and sustainable development and root cause attention are the new foci. Groups selectively retained the interests that helped generate earlier support of their organizations. Seven groups had net additions to their portfolios of interest in 1995. Additional areas for these groups included environmental justice, economic reform, sustainable development, and women empowerment/women's health. Overall, environmental interest groups appear to be shifting away from the concerns of solid waste, toxic substances, soil contamination, and lead to ecosystem management and global sustainable development issues.

With the overall increase in grassroots environmental interest groups, the Army can expect increased activity of local citizen groups when there is an environmental problem or the perception of an actual or potential problem at an installation. The call for and practice of greater and earlier stakeholder involvement is in part a reaction to the success of grassroots interest groups.

A striking example of grassroots environmental interest groups impacting the Army is the Chemical Weapons Working Group (CWWG). This group, which started in Kentucky in opposition to chemical agent/munitions incineration at Blue Grass Army Depot, formed a coalition of community activists who live near the eight proposed chemical weapons disposal facilities in CONUS and the one on Johnson Atoll. This group also signed a joint resolution with a Russian citizens group concerned with the incineration of chemical agents in Russia. CWWG secured the support of the Sierra Club and recently filed a law suit to stop

incineration operations at Tooele, Utah, on the basis of creating an "imminent and substantial danger to public health and the environment" in violation of National Environmental Policy Act, CAAA and Resource Conservation and Recovery Act (RCRA). CWWG was also successful in getting legislation introduced at the state level in Alabama that would place restrictions and preconditions on the chemical demilitarization program and consideration by Congress to redirect funding to expand technology research on alternatives to incineration of bulk agents and chemical munitions.

The popularity of grassroots groups, stimulated by citizen concerns over hazardous waste sites and disposal facility sitings and operations, means the formation of such a group is certainly a potential at any Army installation perceived by the neighboring citizens to have an environmental problem. A rallying force for citizens groups is base closure because it almost always has economic implications for the community. The environmental consideration linked most often to base closure is installation restoration. Interest groups generally want accelerated cleanup to facilitate transfer and reuse of the property and restoration to cleanup levels that will result in unconditional use of the site.

The increased popularity of interest groups that acquire land resources could have a favorable impact on the Army. The success of these organizations could reduce pressure on the Army to give up property or restrict use to preserve natural habitats. Another implication, however, could be that the increased attention on preserving open space and habitat would restrict the Army's intended land use and additional property acquisition. This includes Army property and the Army's use of the land of others.

The outcome of interest group activities to preserve the provisions of the ESA will have significant impact on the Army. If provisions are lessened, the Army could demonstrate environmental stewardship by going beyond compliance and/or electing to comply with relaxed standards to reduce the economic impact of ESA on Army activities.

Finally, the shift in approach of some large organizations to target lending institutions' practices and tax codes and not focus on site specific environmental issues appears to put less attention on issues specific to the Army. Although the attention of interest groups is typically thought of as a negative impact by Army personnel and something to avoid, the attention can contribute to an Army problem getting funding and corrective action.

2.15.2 Foreign Environmental Interest Groups

Many foreign environmental groups increased attention in global and regional financial institutions such as the World Bank, International Monetary Fund, and the Asian Development Bank and multinational private corporations. The focus is to control environmentally and socially damaging investments in developing countries by changes in lending policies and greater public disclosure and participation.

European environmental interest groups are attempting to influence the environmental standards the EU adopts. The good news for the Army is greater uniformity among member EU countries. Increased compliance costs may be the impact on the Army within the EU. By foreign interest groups focusing on EU policy they are likely to be less focused on the activities of the Army in the EU countries. Exceptions to this are the local grassroots citizen groups with a common environmental concern such as aircraft noise or weapons firing

The influence of interest group activities in Panama and Turkey appears minor. Their activities are concerned mostly with recreational activities or ecotourism. The focus of Japan's interest groups has been mostly on environmental protection in developing countries, not on problems in Japan. The interest groups in all three of these countries have little apparent influence on their countries' environmental policies, laws, and regulations.

3. Summary

The following summarizes the potential impacts and overarching conclusions on the Army from the trends, issues, and activities documented in this report.

- State initiatives and actions are taking on greater relevance than federal actions in many areas. Actions at state, rather than federal, level are increasingly regulating Army environmental programs, requiring the Army's environmental coordinators to be knowledgeable of recently established and impending state laws and regulations. This increase in state and local autonomy may also place additional unprogrammed requirements on Army installations that can reduce available base operations funding and adversely affect readiness.
- At the federal level, administrative actions are taking on greater importance because of the deadlock over most environmental legislation. These administrative actions can require environmental policy development by the Army, such as that required by the executive order on environmental justice, and reporting, such as that required by the executive order on toxic chemical release application to federal facilities. The administrative actions often require unprogrammed change to management practices and can divert resources from other activities.
- Uncertainty about the future of environmental legislation and regulation triggered by the November 1994 election results indicates either the start of a growing national mandate or a one-time abnormality. There is a clear indication that change is required to current environmental legislation and regulation, but retreating from established standards is not desired by the public or the administration. The November 1996 elections will contribute to clarifying this situation and influencing its pace.
- The attitude of the public is that environmental quality in the United States is acceptable, that major improvements were made over the years, and that additional improvements would cost increasingly more in some cases for marginal gains. This attitude contributes to the position of not increasing overall federal spending on the environment by any significant amount, with a trickle-down impact on the Army's environmental budget. Increases in the Army's environmental budget, in terms of real dollars, on a long-term continuing basis over the current fiscal year level is unlikely. Maintaining environmental spending at or near the current percentage level of the Army's overall budget will be a challenge. Unfortunately, seventy-six percent of the trends discussed herein have associated increased budget implications.
- Army readiness is directly affected by sixteen of the fifty-five trends analyzed. The environmental trends impacts indicate that Army readiness in the future will be more adversely affected by ecological risk based consideration rather than human health risk based considerations. This will have resource allocation repercussions, possibly requiring the Army to direct more resources to systems addressing ecological issues to minimize

impacts on readiness. Such systems include training range management, ecological risk assessments, and other related conservation issues.

- Human health risk assessment and ecological risk assessment methodologies are expanding in use for both setting site specific emission standards as well as dealing with contaminated site cleanup requirements. This movement away from arbitrary standards will most likely can impact the Army's environmental expenditures by the anticipated less stringent environmental standards reducing the expense associated with solutions in many situations
- The United States may find itself influenced greatly by EU actions because of international commerce issues. Europe seems to be capturing the environmental lead from the United States in many areas. This can impact American environmental regulation by forcing the United States to conform to an international standard, which is often, but not always, more practical and less restrictive than U.S. standards. This might soften OCONUS compliance requirements for the Army and require fewer resources to be in compliance; however, this would most likely have little impact upon CONUS requirements.
- Shifts to multimedia regulation will require major legislative and regulatory overhaul that can take many years because of the pace of Congressional action, complexity and sheer magnitude of existing legislation and regulation, resistance of certain interests to change, and the relative priority of environmental reform in comparison to other issues on the government's agenda. Therefore, media-specific legislation and regulation can be expected to continue, with only small, incremental changes towards consolidation occurring in legislation and regulation, enabling the Army to slowly transition to a more consolidated environmental management posture
- Reduced budgets and a smaller federal government workforce are likely to cause cutbacks in enforcement, monitoring, and data collection precluding the establishment of any major new environmental initiative. Emphasis is likely to focus on the shorter-term, high-priority environmental issues rather than longer-term issues. This will impact the Army's environmental programs by deemphasizing certain areas and requiring the bulk of resources to address current compliance issues with less resources available for prevention and longer-term issues
- Interagency programs are likely to suffer larger budget cuts and more disbandments as agencies "circle their wagons" to protect core mission responsibilities and in-house staff. This will make it more difficult for the Army to work cooperatively to develop technology, collect data, develop policy, and share expertise with other federal and state agencies. Ecosystem management is an area that can be significantly impacted.
- Discretionary environmental investments (anything not mandated by legislation or regulation), even if supported by cost-benefit studies, will not automatically be funded within the government because of the budget control. This will likely reduce the Army's

conservation and pollution prevention activities more than cleanup and compliance. If continued long-term, the Army will have to rely more extensively on private sector developments for pollution prevention and conservation technology and management developments.

- Pollution prevention has become pervasive and its concepts will have to be willingly embraced by the logistical and operational elements of the Army as the least-cost way of doing business and in the best interests of the Army's long-term readiness. This impacts the fundamental doctrinal and education objectives of the Army's environmental program and requires the funding, infrastructure, personnel, and policy to support it.
- Movement toward consolidation of service programs within DoD is likely to gain support and momentum. This is beginning to occur in other agencies and extends to the environmental program. Agency consolidation impacts all of the Army's environmental programs and invites greater investment in cooperative and unified efforts by the Services.
- Individuals and organizations external to the DoD play a more important role in shaping Army environmental policy. The movement toward greater public participation in shaping national environmental policy; the greater role of state and local governments in administering environmental programs; direct dialogue between Army installations, regulators and the public; and reaction to litigation brought against the Army impart greater influence on the Army's environmental protection practices. This influence primarily affects the prioritization of environmental projects and funding, elevating the projects considered to be important by the public over the projects the Army may rank as more important. This can indirectly reduce unit readiness, slow important technology developments, and change infrastructure requirements and personnel actions.
- Approximately three-quarters of the trends reflect an increased requirement for resources in the out-years with only marginal environmental resource increases anticipated. This impacts all aspects of environmental management with its successful execution dependent upon prudent prioritization of environmental program objectives, innovative environmental management, improved environmental education of the most senior Army leadership, and utilization of emerging technologies for management and execution.

Appendix A

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